

A REVISION OF *CORDIA* SECTION *GERASCANTHUS* (BORAGINALES: CORDIACEAE)

James S. Miller

The New York Botanical Garden
Bronx, New York 10458, U.S.A.

ABSTRACT

A taxonomic revision is provided for *Cordia* section *Gerascanthus* and 23 species are recognized. They are characterized by flowers with tubular, ribbed calyces, marcescent corollas that persist and surround the developing fruits, aiding in their wind dispersal, and single-seeded ellipsoid fruits with a fibrous wall. All of the species are restricted to the Neotropics. Thirteen occur in Mexico, and the remainder are scattered throughout Central America, the West Indies, and South America; however, there is no secondary center of diversity. Classification of the section and its morphology are reviewed, and a key and descriptions are provided for all species along with notes on their distributions and conservation status.

RESUMEN

Se hace una revisión taxonómica de *Cordia* section *Gerascanthus* y se reconocen 23 especies. Se caracterizan por sus flores con cálices tubulares provistos de costillas, corolas marcescentes que persisten y rodean los frutos en desarrollados, ayudando en su dispersión anemófila, y frutos elipsoides uniseminados -provistos de una envuelta fibrosa. Todas las especies están restringidas a la región Neotropical. Trece ocurren en México, y las restantes están dispersas por toda América Central, las Indias Occidentales, y Sur América; sin embargo, no hay centro secundario de diversidad. Se revisa la clasificación de la sección y su morfología, y se aporta una clave y descripciones de todas las especies junto con notas de sus distribuciones y status de conservación.

INTRODUCTION

Cordia has historically been defined in a broad sense (e.g., Johnston 1930; Miller 2001) with estimates for the number of species ranging from 250 (Airy Shaw 1973) to 350 (Miller 2001). However, in the last two decades, a number of advances in our understanding of its relationships with other related genera, relationships within the genus, and floristic studies of the constituent species have added considerably to what we understand. Several phylogenetic studies have shown that Boraginaceae, which have historically been considered to comprise four very distinct and morphologically different subfamilies: Cordioideae, Ehretioideae, Heliotropioideae, Boraginoideae (Johnston 1951), were more complicated (Gottschling & Hilger 2001; Gottschling et al. 2005; Moore & Janse 2006; Nazaire & Hufford 2012; Weigend et al. submitted). Several other families, or enigmatic genera, including Hydrophyllaceae, Lennoaceae, and the African genera *Codon*, *Hoplestigma*, and *Wellstedtia* were all embedded within the Boraginaceae, but all of the original four subfamilies were proven to be monophyletic, although a few genera had historically been placed in the wrong group (Gottschling et al. 2005). It is now clear that *Saccellium* and *Coldenia*, both long considered allied with *Ehretia*, are more closely related to *Cordia*, the former included within it and the later sister to *Cordia* and *Varronia* (Gottschling et al. 2005). This has led to the recognition of a broadly defined Boraginales (Gottschling et al. 2005), including each of the four traditional subfamilies elevated to familial status, Cordiaceae, Ehretiaceae, Heliotropiaceae, and Boraginaceae, and also inclusion of the Hydrophyllaceae, Lennoaceae, Hoplestigmataceae, Wellstedtiaceae, and newly described Codonaceae (Weigend & Hilger 2010).

For the Cordiaceae, the studies of Gottschling et al. (2005) elucidated that the Old World procumbent annual herb *Coldenia procumbens* was sister to all of the other woody members of Cordiaceae and then *Cordia* section *Varronia* was sister to all of the rest of *Cordia* and the three small genera that had been recognized because of unique, unusual fruits, which all have large accrescent calyces (*Auxemma* Miers, *Patagonula* L., and *Saccellium* Bonpl.), were all embedded in *Cordia* and allied with the species of *Cordia* section *Cordia*. Based on this evidence, Miller and Gottschling (2007) segregated *Varronia* and restricted *Cordia* to the members of sec-

tions *Cordia*, *Gerascanthus*, *Myxa*, and *Superbiflorae*, though the molecular data clearly show that the Old World and New World species of section *Myxa* are distinct clades, even though they appear morphologically similar. Now that checklists are being compiled for the Online World Flora, there appear to be approximately 230 known species of *Cordia* and an additional 124 species of *Varronia*, though there are still clearly dozens of undescribed species of both genera awaiting description from undetermined folders in major herbarium collections.

Cordia section *Gerascanthus* has always been a difficult group (see quotes in Wheeler 1942; Johnston 1950). It is morphologically distinct and easily recognizable as a group of species, characterized primarily by its unusual fruits, which are ellipsoidal, single-seeded, fibrous-walled, and most distinctively surrounded and completely enclosed in the persistent calyx and marsescent corolla, with the corolla drying, turning brown and apparently assisting like a small parachute with wind dispersal of the mature fruit. But while the section may be easily recognized, the species have long been difficult to tell apart, prompting Chodat and Vischer (1920) to write "We are, in fact, dealing with species which are but feebly defined morphologically and the taxonomy of which will require revision from time to time as observations in the field increase in number." The species of section *Gerascanthus* are not distributed evenly, and though they occur throughout the Neotropics, most of the South American species were known from few collections or were discovered relatively recently, and the greatest concentration of species is in western Mexico, a group provided with a relatively solid revision (Johnston 1950), though Johnston knew eight of his twelve species from fewer than 3 collections, four from the type only.

MORPHOLOGY

Habit

Most species of *Cordia* sect. *Gerascanthus* are small to medium-sized trees. Only a few species are truly large. *Cordia megalantha* is the largest, occasionally reaching 60 m tall, and *C. alliodora* and *C. trichotoma* often reach 30 m. *Cordia insignis* is a shrub of Brazilian cerrado that apparently grows from an underground xylopodium and flowering individuals are generally only 1–5 m tall and at least in some situations, its above ground stems appear to be annual.

Descriptions of bark are generally not included with most specimen label data, though bark is often a characteristic feature. Most species have smooth pale gray bark. *Cordia morelosana* has dark gray, rough and deeply fissured bark, which is one character that distinguishes it from *C. sonora*, a species that is morphologically similar and difficult to distinguish from herbarium specimens but has smooth, pale gray bark.

Species of *Cordia* are not infrequently associated with ants but the association is generally casual, with ants living under patches of bark or in hollowed twigs. There are, however, two true myrmecophilous species of *Cordia*, which are unrelated and independently derived (Gottschling, 2005). *Cordia nodosa*, of sect. *Myxa*, has domatia that are swollen, hollow petioles. *Cordia alliodora*, of sect. *Gerascanthus*, has domatia that are hollow, ellipsoid swellings at the ends of branches and the bases of inflorescences that are generally inhabited by small, biting ants of more than a dozen genera (Wheeler 1942). These swellings are filled with a loose pithy material that is presumably easily removed by the ants. The domatia are characteristic of the plants and not simply the result of infestation by the ants as domatia form normally on plants grown in the greenhouse in the absence of the ants. Ants have been associated with all of the trees I have observed in Mexico, but they have frequently been absent from trees in Central America.

Indument

Trichomes of various types are often associated with Boraginales and they are frequently taxonomically useful for distinguishing species and sometimes understanding relationships. While indument is often somewhat variable with a given species, types of individual hairs are often diagnostic. Indument can vary considerably, not only between species and individuals, but also from one plant part to another, so it is described independently for each successive organ in the descriptions provided here. There are five different types of hairs found in the genus *Cordia* and four of these occur in various species of section *Gerascanthus*; the fifth type, echinate

hairs, are known only in *Cordia cymosa* of section *Myxa*. The four types of hairs found in section *Gerascanthus* include:

- 1) *Simple hairs*.—These are unicellular hairs that are found in the majority of the species and are variable in size, form, and orientation.
- 2) *Simple hairs from a distinct pedestal*.—These are thick-walled, unicellular hairs that arise from a swollen, basal pedestal or cystolith. The shaft of these hairs is usually postulate and the hairs are mostly appressed giving rise to strigose, strigillose, and scabrous induments, depending on the length and thickness of the hairs. The pedestal or cystolith generally appears multicellular. In some cases, the shaft of the hairs weathers and is lost with time, leaving the persistent cystoliths, which result in a rough surface. Hairs from pedestals are common in the genus, but less common in section *Gerascanthus*.
- 3) *Stellate hairs*.—These are multiply-branched, star-shaped hairs that are characteristic of *Cordia alliodora* and *C. trichotoma* in section *Gerascanthus*. Both of these species have stellate hairs with numerous branches and the hairs are sessile. These differ from the stellate hairs in the related genus *Varronia*, which are stalked and obviously have arisen independently.
- 4) *Malpighiaceae hairs*.—These are unicellular, T-shaped hairs with two arms and a median attachment. They are rare in *Cordia* but have arisen independently at least four times in the family, each time with a slightly different appearance. They are known only from *Cordia glabrata*, among the species of section *Gerascanthus*, where they give rise to a whitish cast to the undersurface of the leaves.

Leaves

The leaves of species of *Cordia* section *Gerascanthus* are simple, alternate, entire, and are presumed to be deciduous, although this is not confirmed in all species. Many species flower without their leaves, so it is in some cases difficult to pair flowering specimens with sterile specimens with leaves. Leaves vary considerable in size and form and leaf shape and texture are useful characters for distinguishing species. All species have petiolate leaves, and the petioles are generally canaliculate on the adaxial surface, though a few species are only flattened and lack a prominent groove.

Inflorescences

While Boraginales are thought of as characterized by helicoid or scorpioid inflorescences, that condition is apparent only occasionally in *Cordia* and then generally only in the ultimate branches of inflorescences, and it is seldom apparent in species of section *Gerascanthus*. Inflorescences in the section vary from expanded cymes and panicles to compressed and nearly umbellate. All of these are basically cymose-paniculate, but they vary in the degree of elongation of the branches giving rise to a continuum of variation between three different forms:

- 1) Paniculate inflorescences are expanded with a distinct central axis that is a panicle of small cymes, such as in *Cordia macrantha*.
- 2) Cymose inflorescences are also expanded, but lack a central axis and broader in form, such as is found in *Cordia colimensis* and *C. elaeagnoides*.
- 3) Umbellate inflorescences are very compressed with none of the branches elongating and giving rise to a nearly umbellate cluster of flowers. In *Cordia globulifera* these are not true umbels but rather a mere contraction of the branches of a branched inflorescence, but in *C. umbellata* they appear to be truly umbellate with all flowers arising from a single point.

While inflorescence type is generally consistent for each species, *Cordia sonora* has inflorescences that vary from near umbellate in Guerrero, to paniculate on Maria Madre Island, and with both forms in the northern populations in Sinaloa, Sonora, and Chihuahua.

Flowers

Species of *Cordia* sect. *Gerascanthus* are typically distylous and individual plants can readily be separated into long-style and short-style morphs, with respective stamen and style heights varying significantly between the

two. When species are known from adequate numbers of collections, floral measurements are provided separately for the two morphs, though this unfortunately is not the case for the majority of species. In two species, distyly has broken down. In *Cordia alliodora*, the long-style morph has been lost and all individuals have exerted stamens and a short style. In *Cordia trichotoma* an unusual variation occurs, with both long-style and short-style individuals being present in populations but with a third morph with equal stamen and style heights (Gibbs & Taroda 1983).

The species of *Cordia* sect. *Gerascanthus* have a tubular calyx that is usually distinctly 10-ribbed. In a few species, such as *Cordia morelosana*, the indument on the calyx is dense and long enough to obscure the ribs. In other species, such as *Cordia thaisiana*, the calyx is merely striate and lacks the clearly defined ribs characteristic of most species. The calyx persists in all species and encloses the mature fruit.

Section *Gerascanthus* is characterized by corollas that are marcescent and persist, enclosing the mature fruits. As fruits mature, the corollas dry, turn brown, and act as small parachutes that aid in wind dispersal of the fruits. Corollas of species of the section are either tubular with spreading lobes or funnellform. There are generally 5 corolla lobes, though corollas with 4 or 6 lobes are not uncommon in some species. Whether the corolla lobes are oblong, with parallel sides, or ovate to deltate is a feature useful in distinguishing species. The apex of the corolla lobes is generally somewhat rounded or truncate and only in *Cordia megalantha*, *C. latiloba*, and *C. umbellifera* are the corolla lobes drawn to an acute, sharp apex.

The stamens are equal in number to the corolla lobes and all have filaments that are basally adnate to the corolla tube. As the tissue of the filaments is generally distinct to the base of the corolla, measurements given for filament length include the entire length and are followed by the measurements for the free portion above the point of insertion. Filaments can be either glabrous or pubescent at the point of insertion and this is a useful character for distinguishing species and variable only in *Cordia gerascanthus* and *C. morelosana*.

The gynoecium of *Cordia* consists of a superior, bicarpellate ovary that is not divided or lobed. Early in development it is bilocular, but it later becomes falsely 4-locular as a septum forms, dividing each carpel into two separate chambers (Lawrence 1937; Khaleel 1975, 1982). Each of the four locules contains a single, orthotropus ovule but only one develops to maturity, and fruits contain only a single embryo and then seed. All species of the section have an annular, nectariferous disc borne beneath the ovary. These are relatively large compared with the nectaries of species of other sections and are usually visible in dried specimens. *Cordia gracilipes* is characterized by having a disc that is ciliate along the upper margin. The style in *Cordia* is terminal and twice bifid with 4 separate stigma lobes that vary from filiform to clavate or discoid but are always clavate in section *Gerascanthus*.

Fruits

The fruits in species of section *Gerascanthus* are the most distinctive in the genus. They are ellipsoid with a thin, fibrous wall, lacking a mesocarp, and are capped by the persistent base of the style. The fruit swells only slightly during development and remains borne within the persistent calyx and corolla. At maturity, the entire unit is dispersed with the marcescent corolla, aiding in wind dispersal of the fruits.

Pollen

Pollen of the Boraginales is known to be diverse (Avetissian 1956). Nowicke and Ridgway (1973) initially found three types of pollen grains in the genus *Cordia* in a broad sense, including *Varronia* later segregated by Miller and Gottschling (2007). *Varronia* and *Cordia* section *Cordia* each have unique pollen morphology, but *Cordia* section *Gerascanthus* shares pollen grains that are three-colpate to 3-colporate with a spinulose tectum (Nowicke & Miller 1989, 1990) with species of *Cordia* sections *Myxa* and *Superbiflorae*. Largely on this basis, Taroda and Gibbs (1986) grouped these three sections in a broadly defined *Cordia* subgenus *Myxa*.

TAXONOMIC TREATMENT

Cordia* section *Gerascanthus (P. Browne) G. Don, Gen. Hist. 4:380. 1837; A. DC, Prodr. 9:471. 1845; *Gerascanthus* P. Browne, Civ. Nat. Hist. Jamaica 170, t. 29, f. 3. 1756; *Cordia* subgenus *Gerascanthus* Schlect & Cham., Linnaea 5:115. 1830.
TYPE: *Cordia gerascanthus* L.

Cordia* section *Cerdanae (Ruiz & Pavon) Roem. & Schultes, Syst. Veg. 4:467. 1819. *Cerdana* Ruiz & Pavon, Fl. Peruv. Prodr. 37, t. 6. 1794; *Cordia cerdana* Roem. & Schultes, Syst. Veg. 4:467. 1819. TYPE: *Cerdana alliodora* Ruiz & Pavon = *Cordia alliodora* (Ruiz & Pavon) Oken.

Small to large trees. Leaves deciduous, alternate, petiolate. Inflorescences paniculate, cymose-paniculate, or sometimes with the axes much reduced and nearly umbellate. Flowers usually distylous, homostylous in *Cordia alliodora*; calyx tubular, usually distinctly 10-ribbed or occasionally merely striate; corolla white, marcescent, tubular with spreading lobes or funnellform, usually 5-merous, the lobes usually spreading; stamens the same number as the corolla lobes, the filaments pubescent or glabrous, the anthers usually oblong; ovary with an evident, usually annular, disc. Fruits borne within the persistent calyx and corolla, wind-dispersed, ellipsoid, the walls thin and fibrous, capped by the discoid base of the style.

Cordia section *Gerascanthus* consists of 23 species, all restricted to the Neotropics. Thirteen species occur in Mexico, and though the species are spread throughout Central America, the West Indies, and South America, there is no other substantial center of diversity.

KEY TO THE SPECIES

Plants with stellate hairs.

- Twigs ending in ant domatia; corollas less than 14 mm long _____ ***C. alliodora***
 Twigs not ending in ant domatia; corollas greater than 15 mm long _____ ***C. trichotoma***

Plants with simple hairs.

Corolla lobes parallel sided.

Staminal filaments glabrous.

- Inflorescences condensed, nearly umbellate _____ ***C. globulifera***

Inflorescences paniculate, decidedly elongate.

- Calyx striate, glabrous _____ ***C. cardenasiana***

- Calyx distinctly ribbed, pubescent _____ ***C. gerascanthus***

Staminal filaments pubescent.

Calyx striate but lacking elevated ribs, glabrous or nearly so.

- Corollas 15–24 mm long, the lobes 6–10 mm long; inflorescence branches stout _____ ***C. thaisiana***

- Corollas 22–30 mm long, the lobes 11–14 mm long; inflorescence branches very thin, delicate _____ ***C. goeldiana***

Calyx evidently 10-ribbed, puberulent or strigillose to velutinous or pubescent.

- Lower leaf surface glabrous (Mexico to Costa Rica; West Indies) _____ ***C. gerascanthus***

- Lower leaf surface whitish, with malpighiaceae hairs (Brazil, Bolivia, Paraguay) _____ ***C. glabrata***

Corolla lobes widely ovate to deltate, not parallel sided.

Corolla lobes acute at the apex.

- Leaf base acute, rarely obtuse to rounded; calyx striate _____ ***C. megalantha***

- Leaf base cuneate to obtuse; calyx evidently 10-ribbed _____ ***C. latiloba***

Corolla lobes rounded to obtuse at the apex.

Staminal filaments pubescent.

Inflorescences condensed, nearly umbellate.

- Calyx nearly glabrous (South America) _____ ***C. umbellifera***

- Calyx velutinous to villous (Mexico) _____ ***C. sonoreae***

Inflorescences expanded, cymose to paniculate.

Calyx less than 11.5 mm long.

- Plants flowering with leaves; leaves glabrous, elliptic to narrowly elliptic _____ ***C. tinifolia***

- Plants flowering while leafless; leaves puberulent on the abaxial surface, elliptic to widely ovate _____ ***C. macvaughii***

Calyx greater than 11.5 mm long.

Calyx glabrous or nearly so.

- Leaf blades widely elliptic to elliptic-ovate, 4.5–15.3 cm wide, fruits ellipsoid, the wall fibrous _____ ***C. macrantha***

- Leaf blades lanceolate to ovate, (2.5–)4–5 cm side, fruits ovoid, the wall hard, bony _____ ***C. iguaguana***

Calyx with an evident indument.

- Shrubs; leaf blades generally greater than 15 cm long, rugose-bullate; inflorescences covered with dense yellow hairs (South America) _____ ***C. insignis***

Trees; leaf blades generally less than 15 cm long, not bullate; inflorescences covered with white hairs (Mexico).

- Erect tree with a distinct central leader; leaves glabrous, elliptic to elliptic-lanceolate _____ ***C. sonoreae***

- Spreading tree without a central leader; leaves scabrous adaxially, elliptic _____ ***C. morelosana***

Staminal filaments glabrous.

- Leaves with whitish malpighiaceae hairs below (South America) _____ ***C. glabrata***

- Leaves glabrous or with simple hairs below (Mexico).

Calyx 6.5–8 mm long _____	C. igualensis
Calyx greater than 9 mm long.	
Calyx velutinous, the hairs generally concealing the ribs _____	C. morelosana
Calyx with only minute hairs, the ribs evident.	
Leaves arachnoid-tomentose below _____	C. guerckeana
Leaves glabrous below _____	C. gracilipes

1. *Cordia alliodora* (Ruiz & Pav.) Oken, Allg. Naturgesch. 3(2):1098. 1841. (**Fig. 1**). *Cerdana alliodora* Ruiz & Pav., Fl. Peruv. 2:47. 1799. *Cordia alliodora* (Ruiz & Pav.) Cham. ex A. DC., Prodr. 9:472. 1845. *Lithocardium alliodorum* (Ruiz & Pav.) Kuntze, Revis. Gen. Pl. 2:976. 1891. *Gerascanthus alliodorus* (Ruiz & Pav.) M. Kuhlmann & Mattos, Loefgrenia 47:1. 1970. *Gerascanthus alliodorus* (Ruiz & Pav.) Borhidi, Acta Bot. Hung. 34(3–4):396. 1988. TYPE: PERU. HUÁNUCO: Pozuzo, Ruiz s.n. (LECTOTYPE: B; photos: F, MO).

Cordia cerdana Roem. & Schult., Syst. Veg. 4:467. 1819.

Cordia alliodora f. *albotomentosa* Chodat & Hassl., Bull. Herb. Boissier 2, 5:304. 1905. TYPE: PARAGUAY: in campis siccis, prope Concepción, August, Hassler 7155 (HOLOTYPE: G).

Cordia alliodora var. *boliviana* Chodat & Vischer, Bull. Soc. Bot. Genève, sér. 2, 12:211. 1921. TYPE: BOLIVIA. BENI: Beni River, Rusby 1902 (HOLOTYPE: G; ISOTYPES: F, GH, MO, US).

Cordia alliodora var. *glabra* A. DC., Prodr. 9:472. 1845. TYPE: PERU: Pavón s.n. (HOLOTYPE: G).

Cordia alliodora var. *tomentosa* A. DC., Prodr. 9:472. 1845. TYPE: PERU: Pavón s.n. (HOLOTYPE: G; ISOTYPE: P).

Cordia andina Chodat, Bull. Soc. Bot. Genève, sér. 2, 12:211. 1921. TYPE: BOLIVIA. BENI: Reis, elev. 1,500 ft, Rusby 1903 (HOLOTYPE: G; ISOTYPES: GH, M, US, WIS).

Cordia chamissoniana var. *complicata* Chodat, Bull. Soc. Bot. Genève, sér. 2, 12:215. 1921. TYPE: ECUADOR: 1778, Ruiz s.n. (HOLOTYPE: G).

Cordia cujabensis Silva Manso & Lhotsky ex Cham., Linnaea 8:121. 1833. *Lithocardium cujabense* (Silva Manso & Lhotsky ex Cham.) Kuntze, Revis. Gen. Pl. 2:976. 1891. *Gerascanthus cujabensis* (Silva Manso & Lhotsky ex Cham.) Borhidi, Acta Bot. Hung. 34:396. 1988. TYPE: BRAZIL. MATTO GROSSO: Cuyabá, Manso & Lhotsky 13 (HOLOTYPE: B; ISOTYPE: G).

Cordia gerascanthus f. *martinicensis* Chodat, Bull. Soc. Bot. Genève, sér. 2, 12:210. 1921. TYPE: MARTINIQUE: Hahn 626 (HOLOTYPE: G).

Cordia gerascanthus var. *subcanescens* A. DC., Prodr. 9:472. 1845. TYPE: TRINIDAD: in Ins. Trinitatis, Sieber 12 (HOLOTYPE: G; ISOTYPE: M).

Cordia goudotii Chodat, Bull. Soc. Bot. Genève, sér. 2, 12:215. 1921. TYPE: COLOMBIA: Vallee de la Magdalena, Goudot s.n. (HOLOTYPE: G).

Cordia rusbyi Chodat, Mem. Torrey Bot. Club 6:83. 1896. TYPE: BOLIVIA: Mt. Tunari, near snow line, 1891, M. Bang 1110 (HOLOTYPE: NY; ISOTYPES: GH, MO, NY, US).

Cordia velutina Mart., Flora 21 (2, Beibl. 4):85–86. 1838. TYPE: BRAZIL: Morro do Ernesto, prope Cujabá, Martius 268 (HOLOTYPE: M; ISOTYPES: E, G, NY, P).

Varronia tuberosa Sessé & Moc., PL. Nov. Hisp. 30. 1888. TYPE: MEXICO: In caldissimis Meitepeci montibus, Sessé & Mociño s.n. (HOLOTYPE: G).

Tree to 20(–25) m tall, slender, with a narrow crown, bark gray, smooth on young plants, later fissured, twigs ending in obovoid ant domatia to 3(–4) cm long, 1.5–2 cm broad, glabrescent, stellate-pubescent when young. Leaves deciduous; petioles (5–)8–28(–35) mm long, flattened or sometimes canaliculate on the adaxial surface, stellate-pubescent; blades elliptic to narrowly elliptic or slightly obovate, (3.5–)5–17(–20.5) cm long, (1.4–)2–7(–8.5) cm wide, the apex acuminate or acute, the base acute to obtuse, the margin entire or slightly unevenly undulate, the adaxial surface glabrous to sparsely stellate-pubescent, the abaxial surface pale, sparsely to densely stellate-pubescent. Inflorescences terminal, paniculate, often with small leaves subtending the major branches, to 16(–20) cm tall, 25(–30) cm broad, many-flowered, the branches usually densely stellate-pubescent. Flowers on short spurs to 1.5 mm long, bisexual, monomorphic, the stigmas borne below or at the same height as the stamens; calyx tubular, 4–5.5(–6.5) mm long, 2–3(–4) mm wide at the mouth, 10(–12)-ribbed, stellate-pubescent, with 5 small acuminate to attenuate teeth, these 0.5–1(–1.5) mm long; corolla marcescent, white, (8.5–)9.5–12(–14) mm long, with 5 oblong lobes, these 5–7(–8.5) mm long, 2–3(–4) mm wide, the tube (3.5–)4.5–6(–8.5) mm long, stamens 5, the filaments (7–)9–12(–14) mm long, the upper (3.5–)5.5–7.5(–9) mm free, sparsely pubescent at the point of insertion, the anthers oblong, 1.5–2(–2.5) mm long, 0.7–1 mm broad, glabrous; style (4–)4.5–6.5(–8.5) mm long, the stylar branches 1.5–2.5 mm long, the stigma lobes clavate. Fruits enclosed by the persistent corolla and calyx, brown, ellipsoid to narrowly ellipsoid, 5–7(–8) mm long, 2–2.5 mm broad, one-seeded, endocarp thin, fibrous.

Distribution and habitat.—*Cordia alliodora* is the most wide-ranging species of section *Gerascanthus* ranging from Sinaloa and Tamaulipas in northern Mexico through Central America and the West Indies, to Brazil,

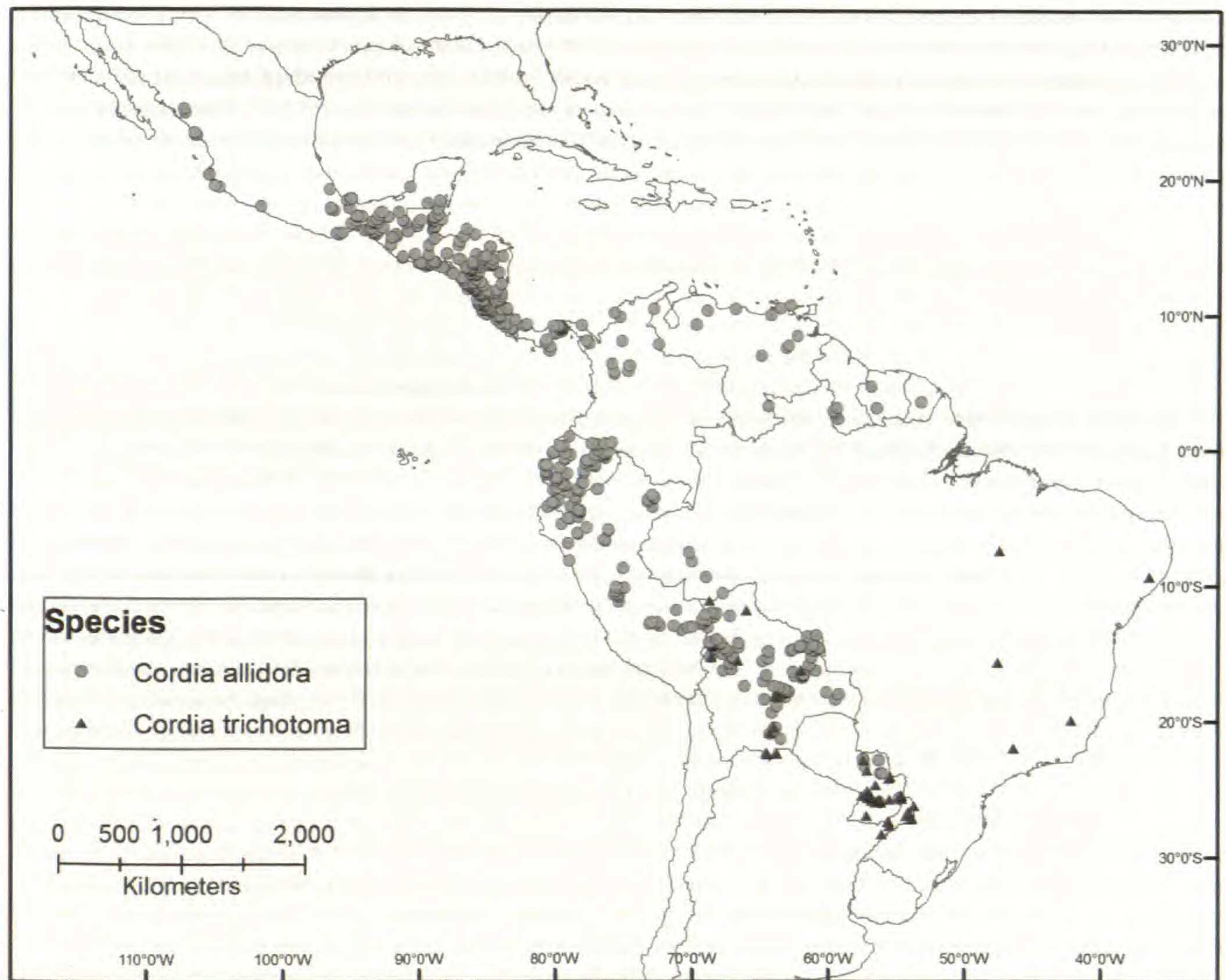


FIG. 1. Distributions of *Cordia allidora* and *C. trichotoma*.

Bolivia, and Argentina. It is replaced in Eastern Brazil by its closest relative *Cordia trichotoma*. It occurs across a wide variety of habitats, from dry to wet forests and ranges from sea level to 1,500 m or rarely as high as 1,900 m in elevation.

Representative specimens examined: **ARGENTINA.** **Jujuy:** Ledesma, Lillo 57197 (US). **Salta.** Prov. Oran, Ruta No. 34 acceso a Río San Francisco, Krapovickas et al. 18650 (MO). **BELIZE.** **Belize:** Gracie Rock, Sibun River, elev. 5–130 m, Gentle 1561 (MO). **Cayo:** Chiquibul Road, S of Guacamallo Bridge, elev. 30 ft, Whitfoord 2866 (MO). **Orange Walk:** hillside in high bush, Indian Church, Arnason & Lambert 17557 (MO). **Stann Creek:** Big Creek, Schipp 142 (MO). **Toledo:** Maya Mountains, Bladen Nature Reserve, upper Bladen Branch basin, Mukle Bal Tsul ruin, elev. 400 m, Holst 5407 (BRH, MO, SEL). **BOLIVIA.** **Beni:** Prov. Vaca Diez, "Potrero municipal," 3 km SW of Riberalta, Daly et al. 2060 (NY, MO). **Chuquisaca.** Naranjitos, camino entre Naranjitos—Río Nuevo, ca. 2 hrs et El Palmar, elev. 1,150–1,800 m, Lozano 1224 (MO). **Cochabamba:** Cochabamba, Bang 1178 (MO, NY, US). **La Paz.** S. Yungas, basin of Río Bopi, San Bartolome (near Calisaya), elev. 750–900 m, Krukoff s.n. (MO, NY). **Pando.** W bank of Río Madeira, 2 km N of Abuna, Prance et al. 6114 (MO, NY, US). **Santa Cruz:** Prov. Florida, Loc. de Hierba Buena, elev. 1,300 m, Steinbach 270 (MO). **Tarija:** 0.2–0.4 km NE of the bridge over Río Pilcomayo of the Villa Montes—Entre Ríos road, 5.5 km (by road) W of center of Villa Montes, elev. 390 m, Nee 53257 (MO, NY). **BRAZIL.** **Acre:** near mouth of Río Embira (Tributary of Río Yaco), Krukoff 4788 (MO, NY, US). **Amazonas:** near mouth of Río Embira (Tributary of Río Tarauaca), Krukoff 4788 (MO, NY, US). **Bahia:** Município de Ilheus, Area do CEPEC, Km 22 da Rodovia Ilhéus/Itabuna (BR 415), Jardim et al. 1102 (NY). **Ceara:** without locality, Gardner 1780 (F). **Distrito Federal:** Basin do Río Bartolomeu, Heringer et al. 7183 (NY). **Goias:** Serra do Caiapó, ca. 5 km (straight line) S of Caiapônia, elev. 850 m, Anderson 9475 (MO). **Maranhao:** Rodovia Belém—Brasília, 5 km de Imperatriz, Pires 16117 (MO). **Mato Grosso:** Serra do Roncador, Cerrado, ca. 60 km N of Xavantina, elev. 550 m, Irwin et al. 16668 (NY, US). **Para:** Upper Cupary River, plateau between the Xingu and Tapajos Rivers, Krukoff 1153 (MO, NY). **Rondonia:** Basin of Río Madera, Km 166–169, Madeira—Mamore railroad near Huttumparana, Prance et al. 5687 (NY, US). **Sao Paulo:** Município de Matao, 12 km SSE of Matao, Eiten et al. 3002 (NY). **COLOMBIA.** **Antioquia:** Cauca Valley, 15 km NE of Bolívar, Gentry & Renteria 23690 (MO). **Bolivar:** Norosi-Tiquisio trail, Lands of Lova, elev. 1500–600 m,

Curran 177 (US). **Boyaca:** El Humbo, 130 mi. N of Bogotá, elev. 3,500 ft, Lawrence 581 (MO, US). **Caldas:** Palestina, elev. 1,500 m, Duque et al. 3753 (US). **Cesar:** 5 km W of Manaure, elev. 440–460 m, Gentry et al. 60727 (MO). **Cundinamarca:** vicinity of Apulo, elev. 455 m, Killip et al. 38255 (US). **Huila:** near Algeciras along road to 2 km N of town, Baraya, elev. 1,500 ft, Little 8093 (US). **Magdalena:** Santa Marta, elev. 150 ft, Smith 805 (MO, US). **Narino:** De Tumaco, Río Chagüi, Vereda La Honda, elev. 15 m, Madrigal et al. 787 (MO). **Putumayo:** Margenes del Río Guamues, San Antonio del Guamues, elev. 310 m, Cuatrecasas 11182 (US). **Risaralda:** Carretera entre caserío Estación Villegas y Hacienda Los Visos, cerca de Río Consota (tributario del Río La Vieja), pie de monte de vertiente occidental de Cordillera Central, acceso desde carretera Cerritos—Pereira en Camino Real, elev. 8 m, Silverstone-Sopkin & Paz 7229 (MO). **Sucre:** Via Coloso—Chalan—Ovejas, elev. 150–300 m, Cuadros & Gentry 4660 (MO). **Tolima:** Honda, elev. 250–300 m, Pennell 3556 (MO, US). **Valle del Cauca:** Mpio. Buena Ventura, Bajo Calima, elev. 40 m, Devia 471 (MO). **COSTA RICA. Alajuela:** La Palma de San Ramón, Brenes 5992 (A, F, GH, NY). **Cartago:** streams and cultivated fields with borders of wild vegetation between Jicotea and the Río Pacuare along the road from Turrialba to Moravia, elev. 650–750 m, Burger & Ramirez 3955 (F, NY, US, WIS). **Guanacaste:** Finca La Pacifica, Gentry 371 (G, MO, WIS). **Heredia:** Río Sarapiquí en Puerto Viejo Poia, Jimenez 3635 (CR, F, NY, US). **Puntarenas:** vicinity of Palmar Norte de Osa, elev. 30 m, Allen 5879 (B, DC, F, GH). **San Jose:** vicinity of El General, elev. 880 m, Skutch 2569 (GH, K, MICH, MO, NY, US). **CUBA. Oriente:** vicinity of El Cuero, Britton & Cowell 12720 (US). **DOMINICAN REPUBLIC. Azua:** Sierra Martín García, 4 km al W de Galindo, elev. 395 m, Zandoni et al. 32886 (NY). **Barahona:** Barahona, Fuertes 209 (US). **Distrito Nacional:** Ciudad de Santo Domingo, Centro Olímpico, Zandoni et al. 27004 (MO, NY). **La Romana:** Cumayasa at 7 km W of La Romana, on highway to San Pedro de Macoris, elev. 5–50 m, Meijta et al. 8921 (MO). **Pedernales:** Along road between Oviedo and Recta Sansón, Smith 10041 (MO). **Peravia:** Bani, Lavastre 2052 (MO). **Salcedo:** Valle del Cibao, 2.8 km SW de Villa Tapia, Próximo a La Barranca, elev. 80 m, Meijta & Pimentel 23711 (MO). **San Cristobal:** 3.6 km from Pilancón on road to Comatillo, elev. 180 m, Zandoni & Meijta 16416 (MO, NY). **Santo Domingo:** Santo Domingo, Rose et al. 4431 (US). **ECUADOR. Bolivar:** Parroquia Telimbela, bosque húmedo Premontano, elev. 2,200 m, Cerón 14552 (MO). **Canar:** La Troncal, Manta Real, a 20 km al SE de La Troncal, elev. 860 m, Vargas & Defas 5776 (MO). **El Oro:** between Portorolo (Gold mine near Zaruma) and El Tambo, elev. 600–1,000 m, Hitchcock 21318 (US). **Esmeraldas:** along river banks near Borbon, Cayapa River, Jativa & Epling 1053 (MO, US). **Guayas:** junction of the provinces of Guayas, Cañas, Chimborazo, and Bolívar, foothills of the western cordillera near the village of Bucay, elev. 1,000–1,250 ft, Camp E-3739 (MO). **Loja:** Puente chico a 12 km N de Alamor, elev. 760 m, Samaniego & Vivar 55 (US). **Los Rios:** Río Palenque biological Station, Km 56, road Quevado-Santo Domingo, elev. 150–220 m, Dodson 6217 (MO). **Manabi:** Parroquia Machalilla, Parque Nacional Machalilla, Comunidad Agua Blanca, Monte Espinoso Troopical, elev. 125 m, Cerón 11716 (MO). **Morona-Santiago:** Road from Limon (General Plaza) to Macas, 12–16 km N of Limon, elev. 900 m, Stein 2822 (MO). **Napo:** Río Pucino, first major tributary of Río Aguarico above bridge at Aguarico (near Lago Agrio) elev. 250 m, Gentry 9728 (MO). **Orellana:** Loreto, Comunidad Waorani de Queihueriuno, elev. 285 m, Cerón 26415 (QAP). **Pastaza:** Pozo petrolero "Golondrina" de PETRO-CANADA, 25 km al NW del pueblo de Curaray, elev. 400 m, Rubio & Gudiño 212 (MO). **Pichincha:** Road Chillogallo-Santo Domingo at junction to the new road, elev. 1,050 m, Holm-Nielson et al. 24863 (MO). **Sucumbios:** Limoncocha, Comunidad Santa Elena, a 8 km de la vía principal a Puerto Itaya, elev. 250 m, Reyes 261 (MO). **Zamora:** Jamboe Bajo, Eastern border of Podocarpus National Park, elev. 1,100 m, Clark et al. 3218 (LOJA, MO, QCNE). **EL SALVADOR. Ahuachapan:** vicinity of Ahuachapán, elev. 800–1,000 m, Standley 19717 (GH, NY, US). **Cabanas:** 2.6 km E of Illobasco, coffee plantation owned by Malcolm Chisholm, elev. 870 m, Davidse et al. 37087 (MO). **La Libertad:** Finca Santa Maria, W of Santa Tecla, on N slopes of a mountain, elev. 750 m, Carlson 169 (A, F, UC). **La Paz:** Carretera a Olocuilta, elev. 750 m, Montalve 3073 (ENCB). **San Miguel:** Finca El Pacayal, Volcán Chinameca, elev. 860 m, Monro et al. 2943 (MO). **San Salvador:** San Salvador, Calderon 105 (MO, NY, US). **Santa ana:** San José Ingenio, P.N. Montecristo, elev. 1,200 m, Martínez 877 (MO). **Sonsonate:** Santa Isabel Ishuatán, elev. 430 m, Rodríguez et al., 1400 (B, BM, INB, LAGU, MO). **FRENCH GUIANA:** Prés de Saul, Oldeman 2071 (MO). **GUATEMALA. Alta Verapaz:** vicinity of Caves, SW of Lanquin, elev. 600–1,000 m, Steyermark 44121 (F, NY, US). **Chiquimula:** Eastern portions of Vera Paz and Chiquimula, Watson 339 (F, GH, US). **El Progreso:** between Tulumajillo and Finca Montanita in foothills, elev. 330–500 m, Steyermark 43354 (F, GH, US). **Escuintla:** Finca Las Flores, near Santa Lucia Cotzumalgalpa, Stead & Styles 92 (FHO, K). **Guatemala:** Trapichite, Kellerman 6489 (US). **Huehuetenango:** Cafetal of Finca Soledad, 5 mi SE of Barillas, Sierra de los Cuchumatanes, elev. 1,150 m, Steyermark 49532 (F, US). **Izabal:** Los Amates, Kellerman 7151 (F, NY, US). **Jutiapa:** Road Guatemala City to Jutiapa at 11 km from Jutiapa, Stead & Styles 89 (FHI, US). **Peten:** La Libertad and vicinity, Aguilar 493 (F, GH, MICH, NO, NY). **Quezaltenango:** Columbia, elev. 3,000 ft, Skutch 2030 (F, G, GH, NY, US). **Retalhuleu:** road Retalhuleu to Las Pilas at ca. 4 km from Retalhuleu, elev. 200 m, Stead & Styles 216 (FHO, K, MEXU). **San Marcos:** Finca El Porvenir, on Potrero Mataxan along Río Cubus, Volcán Tajumulco, elev. 1,000–1,300 m, Steyermark 37580 (F). **Santa Rosa:** 6 km from Chiquimulilla on road to Escuintla, elev. 285 m, Stead & Styles 90 (FHO, NY). **Suchitepequez:** lower slopes of Volcán de Fuego, 7 km SW of Alotenango, elev. 1,100 m, Williams & Williams 43525 (F, MICH). **Zacapa:** Gualán, elev. 420 ft, Deam 271 (F, GH, MICH, MO, NY, US). **GUYANA:** western extremity of Canuku Mountains, in drainage of Takutu River, elev. 100 m, Smith 3096 (US). **HAITI. Nord:** vicinity of St. Michel d'Aralaye, near caverns north of St. Michel, elev. 350 m, Leonard 7758 (US). **Nord-Ouest:** vicinity of Mole St. Nicholas, Leonard & Leonard 13209 (US). **HONDURAS. Atlantida:** vicinity of Tela, elev. sea level, Standley 54523 (F, GH, US). **Colon:** base of Cerro Puerto Arturo on main road, 4 mi E of Trujillo, Saunders 1046 (F, MO). **Copan:** La Francia, Whitford & Stadtmiller 22 (CFMR, us). **Cortez:** 3 km from San Pedro Sula, elev. 300 m, Stead & Styles 70 (FHO, NY). **El Paraiso:** Las Chanpias, elev. 200 m, Araque 145 (MO). **Gracias a Dios:** S de Comunidad de Krausirpe, Río Patuca, elev. 90 m, House 2356 (MO). **Intibuca:** near Jesus de Otoro, Hazlett 1624 (MO). **Islas de la Bahia:** new town of Roatán on the island of Roatán, elev. 50 m, Harmon & Dwyer 3931 (MO). **Morazan:** San Antonia, elev. 1,500 m, Molina 748 (F, GH, LL, MEXU, MO, UC, US). **Olancho:** Montaña El Murullo, Catacamas, elev. 1,000 m, Stead & Styles 56 (FHO, NY). **Santa Barbara:** San Pedro Sula, elev. 1,400 m, Thieme 422 (F, US). **Teguicigalpa:** between Talanga and Moreceli, Stead & Styles 61 (FHO, K, NY). **Yoro:** Yoro, elev. 2,800 ft, Edwards P-752 (MO). **LESSER ANTILLES. Antigua:** Dunning Valley, second growth woodlands on hills in the SW (volcanic) district, Box 1316 (US). **Barbados:** St. Michel, Black Rock, Gooding s.n. **Dominica:** Scott's Head, Hodge 1627 (GH).

Guadeloupe: Baillif et Neux Habitants, *Stehle* 7001 (US). **Martinique:** Tilol a Babets, elev. 300 m, *Stehle* 6031 (US). **Montserrat:** Salem, elev. 600 ft, *Proctor* 18900 (US). **St. Vincent:** *Smith* 1249 (GH, NY). **MEXICO. Campeche:** A 18 km al S de Santa María Xcabak aproximadamente 40 km al N de F. Escárcega, *Cabrera & Cabrera* 13471 (MO). **Chiapas:** Mpio of Ocozocautla de Espinosa, 18–20 km N of Ocozocautla along road to Mal Palo, elev. 800 m, *Breedlove & Thorne* 21019 (CHAPA, DS, F, LL, MEXU, MICH, MO NY, RSA). **Colima:** 20–30 mi NE of Colima along roadside, *Thompson & Fields* 351 (SLPM, TEX). **Guerrero:** Montes de Oca, Vallecitos, *Hinton et al.* 11734 (ARIZ, F, GH, K, MO, NY, US). **Jalisco:** Estación de Biología de Chamela, *Perez* 767 (ENCB, MEXU, NY). **Michoacan:** Mpio. de Aguila, 2 km al N de San Juan de Lima, elev. 100 m, *Rzedowski* 17976 (ENCB, MEXU). **Oaxaca:** Mpio. of Chiltepec, Chiltepec and vicinity, elev. 20 m, *Calderon* 477 (A, LL, UC, US). **Quintana Roo:** a 12 km al Sur del entronque con carretera Escárcega—Chetumal, sobre camino a Ingenio Alvaro Obregón, *Téllez & Cabrera* 1688 (MO). **San Luis Potosi:** Mpio. de Xilitla, El Jobo, elev. 200 m, *Rzedowski* 10151 (DS, ENCB, MEXU, SLPM, TEX, WIS). **Sinaloa:** Imala, *Gentry* 4946 (ARIZ, F, MEXU, MICH, MO, NY, UC). **Tabasco:** 13 km de Villahermosa, *Gonzalez & Perez* 4323 (WIS). **Tamaulipas:** Mpio. Gomez Farias, 4–5 km al NW de Gomez Farias, elev. 50 m, *Oliviera & Martinez* 3621 (MEXU). **Veracruz:** Alto Lucero, along the road between San Juan Evangelista and Tierra Blanca, just W (approx. 3–5 km) of San Juan Evangelista, elev. 150 m, *Miller & Tenorio* 708 (MEXU; MO). **Yucatan:** Lolon, *Flores* 4 (F). **NICARAGUA. Atlantico Norte:** E of Finca Waylawás, 2 km from base of Cerro Waylawás, elev. 90 m, *Pipoly* 4346 (MO). **Atlantico Sur:** El Zapote, 40 km NE de Nueva Guinea. elev. 130–150 m, *Sandino* 4834 (MO). **Boaco:** Camino a Mombachito a los dos lados de la Quebrada Río Grande al NE de Cerro Mombachito, elev. 600–700 m, *Moreno* 3236 (MO). **Chinandega:** Road Chinandega to Somotillo at 50 km from Chinandega and 191 km from Managua, *Stead & Styles* 41 (FHO, NY). **Chontales:** between Santo Tomás and Villa Somozo, *Bunting & Licht* 1110 (F, NY, US). **Esteli:** Ocotal, at ca. 200 km from Managua, elev. 600 m, *Stead & Styles* 1 (F, FHO, NY). **Granada:** Environs de Granada, elev. 40 m, *Levy* 359 (C, G, GH, P). **Jinotega:** Al NE de Wiwili, camino entre El Carment y Wamblan, a lo largo del Río Coco, elev. 250–400 m, *Araquistain & Moreno* 1817 (MO). **Leon:** La Paz, *Baker* 2269 (G, GH, K, L, MICH, MO, NY, POM, UC, US). **Madriz:** Faldo W del Cerro Volcán de Somoto (Tepesomoto), elev. 900–1,100 m, *Araquistain & Moreno* 2070 (MO). **Managua:** Peninsula de Chiltepe, hacienda Corpus Cristi, 9 km al SE de Mateare, elev. 80 m, *Araquistain & Moreno* 1322 (MO). **Matagalpa:** 4 mi downslope from Santa Baría de Ostuma, *Harriman* 14622 (ASU, CHAPA). **Nueva Segovia:** 3 km SW of Jalapa, elev. 700 m, *Neill* 1684 (HNMN, MO). **Rio San Juan:** near Caño Chontaleno 20 km NE of El Castillo (Río Indio Watershed), elev. 200 m, *Neill* 3357 (HNMN, MO). **Rivas:** Isla de Ometepe, al lado N del Volcán Concepción, cafetales do las Angeles y sus alrededores, elev. 250–350 m, *Sandino* 536 (MO). **Zelaya:** vicinity of La Luz-Siuna, elev. 150–200 m, *Bunting & Licht* 657 (F, UC, WIS). **PANAMA. Bocas del Toro:** vicinity of Chiriquí Lagoon, Old Bank Island, *Wedel* 1877 (MO, US). **Canal Area:** Barro Colorado Island, *Croat* 7694 (MO). **Chiriqui:** vicinity of San Felix, elev. 0–120 m, *Pittier* 5279 (US). **Cocle:** Penonomé and vicinity elev. 50–1,000 ft, *Williams* 326 (NY, US). **Colon:** Juan Mina, Río Chagres, elev. 25 m, *Allen* 4198 (G, MO). **Darien:** near mouth of Río Paga on Río Tuirá, *Gentry* 4349 (MO). **Herrera:** vicinity of Ocu, hill above the cantera of Sr. Joaquin Carrizo, limestone area, *Stern et al.* 1721 (MICH, MO, US). **Los Santos:** vicinity of Tonosi, Guanico, elev 117 ft, *Stern et al.* 1856 (MICH, MO, US). **Panama:** San José Island, *Johnston* 570 (GH). **San Blas:** mainland opposite Ailigandi, from mouth of Ailigandi River to 2.5 mi. inland, *Lewis et al.* 154 (AAU, MO, US). **Veraguas:** Border of Veraguas, Coclé, and Herrera provinces along the Río Santa María near bridge of Pan American Highway, 16 km SW of Aguadulce, elev. 0–50 m, *Knapp et al.* 3348 (MO). **PARAGUAY. Alto Parana:** Estancial Río Bonito, *Zardini & Guerrero* 41739 (MO). **Amambay:** West of Colonia Indígena Yvy-Jhu, *Zardini* 44918 (MO). **Concepcion:** Arroyo Tagatiyá—Guazú, *Zardini* 39776 (MO). **Guaira:** Cordillera de Ybytyruzú, gallery forest 5 km S of Melgarejo, *Zardini & Velásquez* 12302 (MO). **Madre de Dios:** Tambopata, Cusco Amazonico, elev. 200 m, *Phillips et al.* 455 (MO). **Pasco:** Oxapampa, vicinity of Huancabamba, Hacienda Yanachaga, elev. 1,850 m, *Smith et al.* 1682 (MO). **Piura:** Huancabamba, ca. 5 km E of Canchaque on route to Huancabamba, *Dillon & Sánchez* 6227 (MO). **Puno:** between Putina and San Ignacio, elev. 1,100 m, *Nuñez & Muñoz* 5154 (MO). **San Pedro:** Yaguareté Forest, *Zardini & Guerrero* 44501 (AS, MO). **Tumbes:** Zarumilla, Matapalo, elev. 720 m, *Díaz et al.* 5449 (MO). **Ucayali:** Coronel Portillo, Bosque Nacional Alexander von Humboldt, Pucallpa—Tingo María Road, elev. 270 m, *Fröhner* 336 (MO). **PERU. Amazonas:** Quebrada Huampami, Río Cenepa, Monte, *Kayap* 806 (MO). **Cajamarca:** Monte Seco, elev. 1,800 m, *Soukup* 3839 (US). **Cuzco:** 1 km N of Pilcopata, edge of Río Madre de Dios, elev. 510 m, *Gentry* 23655 (MO). **Huanuco:** Prov. Leoncio Prado, Rupa Rupa, Castillo Chico, elev. 650 m, *Vasquez* 99 (US). **Junin:** La Merced, elev. 2,000 ft, *MacBride* 5391 (US). **La Libertad:** Trujillo, “Ajo Sacha,” *Meyer et al.* 885 (MO). **Lima:** Pista de entrada a la Univ. Nacional Agraria, Encarnación E34 (MO). **Loreto:** Prov. Maynas, Yanamono, Campamento “Explorama Lodge,” zona Bushmaster, elev. 120 m, *Díaz et al.* 1146 (MO). **San Martin:** 1 km S of Tarapoto, dry forested slopes overlooking Río Huallaga, elev. 350 m, *Gentry et al.* 37716 (MO). **PUERTO RICO. Adjuntas:** Base of Pico Guilarte, 100 m, *Liogier* 10015 (NY, US). **Aguada:** On road from Rincón to Aguada, *Vives* 2999 (UPR). **Aguadillas:** Aguadillas, *Sargent* 573 (US). **Aibonita:** Inter Aibonita et Cari-Blanco, *Sintenis* 2946 (US). **Cabo Rojo:** Cabo Rojo in Monte Grande, *Sintenis* 709 (MO, US). **Caye:** Caye, *Hess & Stevens* 2924 (NY). **Ceiba:** near Ceiba, *Wagner* 692 (A). **Fajardo:** near westernmost radio tower just S of the Route 3/Route 985 corner, elev. 10 m, *Taylor* 9133 (UPRRP). **Isabela:** Bosque Insular de Guajataca, *Little* 13516 (A, NY, UPR, US). **Jayuya:** Jayuya, *Sargent* 3050 (US). **Juncos:** Juncos, in Monte Goyo, *sintenis* 2038 (US). **Manati:** Km 26, Manatí-Villalba highway, *Little* 13712 (US); **Naguabo:** Sierra de Naguabo, Río Icacó and adjacent hills, elev. 465–720 m, *Shafer* 3476 (US). **Penuelas:** Penuelas, *Sintenis* 4883 (MO, US). **Ponce:** Puente Juana Mata, *Goll et al.* 785 (US). **Río Grande:** Coastal hill 2 mi. N of Mameyes (Palmar), elev. 50 m, *Hartley* 13376 (A, US). **Salinas:** Along Route 1 SW of Cayey, 0–2 mi. S of the waterfall and bridge between Routes 162 and 717, *Taylor* 6432 (UPRRP). **San Juan:** Río Piedras, on road leading to station’s garaje, *Gregory* 527 (UPR). **Vega Baja:** Puntas Afuerto, *Goll et al.* 1039 (US). **Vieques:** vicinity of Isabel Segundo, *Shafer* 2447 (NY, US). **Yauco:** between Susua and Yauco, elev. 300 m, *Alain* 9276 (A, NY). **SURINAME. Sipaliwini:** vicinity of Blanche Marie Waterfall on the Nickerie River, elev. 50 m, *Evans* 2335 (MO). **TRINIDAD. Port of Spain:** *Fairchild* 2863 (US). **VENEZUELA. Amazonas:** Dpto. Atabapo, bosque semicaducifolio en lomerios adyacentes al Valle medio del Ocamo, elev. 200 m, *Fernández & Yáñez* 809 (MO). **Anzoátegui:** Puerto La Cruz—El Limón, elev. 600 m, *John* 438 (US). **Aragua:** between Villa de Cura and San Juan los Morros, elev. 500 m, *Williams & Alston* 94 (US). **Bolívar:** 5 km from Hato de Nuria, E of Miamo, Altiplanicie de Nuria, elev. 400 m, *Steyermark* 88411 (US).

Delta Amacuro: Departamento Tucupita, 5–14 km ESE of Los Castillos de Guayana, elev. 50–200 m, *Davidse & González 16342* (MO). **Distrito Federal:** Cerro Naiguatá, laderas pendientes del lado del mar que miran hacia el Norte, arriba del pueblo de Naiguatá, vecindad de Quebrada Frontina, 5 km al SW de los tanque de la Electricidad de Caracas (Cocuizal), elev. 900–1,100 m, *Steyermark 91829* (US). **Guarico:** 15 km SW of Tamaco along main highway between Altagracia de Orituco and Chaguaramus, elev. 150 m, *Davidse 4218* (MO). **Maracaibo:** Mpio. Jesus Enrique Lossada, La Concepción, via Cuatro Bocas, *Aristeguieta et al. 6824* (US). **Merida:** 30 km SW of Mérida, along road to El Vigia, near villaje Mesa Bolívar, elev. 1,000 m, *Breteler 3508* (US). **Miranda:** Hills north of Cumbres de Curumo and south of Santa Fe, elev. 900–950 m, *Berry 1762* (MO). **Mongas:** Caicara, *Smith 200-A* (US). **Sucre:** Peninsula de Pari, scrubby bushy-covered slopes bordering the sea, between Guacuco and Guarataro, elev. 80 m, *Steyermark & Liesner 121003* (MO). **Tachira:** Forested level ground or low hills along small streamlet, just south of La Mulata, near Venezuelan-Colombian border, elev. 300 m, *Steyermark et al. 120241* (MO). **Yaracuy:** Secciones de selva nublada a lo largo del camino entre Aroa y Quebrada Honda y Altamira, elev. 1,200 m, *Steyermark & Bunting 105316* (US). **Zulia:** Perija, *Gines 1324* (US). **VIRGIN ISLANDS. St. John:** Cruz Bay, near Raintree Inn, elev. 0–5 m, *Acevedo et al. 2513* (NY). **St. Thomas:** Hills above Charlotte, *Rose 3177* (NY). **Tortola:** Tortola, *Fishlock 121* (MO).

Cordia alliodora is the most widespread species of section *Gerascanthus*, and it is very distinctive in its evident stellate pubescence on its stems, leaves, inflorescence branches, and calyx so it is even readily recognized when sterile. It has the smallest flowers of the section with corollas less than 14 mm long. It is most closely related to and most easily confused with *Cordia trichotoma*, but differs in having smaller flowers, (8.5–)9.5–12(–14) mm corolla versus 12–17 mm. *Cordia alliodora* also consistently has ant domatia, which *C. trichotoma* does not form. *Cordia trichotoma* also differs in generally having leaves that are tomentose on the lower surface, while *C. alliodora* is generally only pubescent, though some specimens from Cuba and Hispaniola approach tomentose. Gibbs and Taroda (1983) also showed that *C. alliodora* is homostylous, while *C. trichotoma* has three morphs, a long-style form, a short-style form, and a third morph where stamens and styles are the same height.

Cordia alliodora is the most important native timber tree cultivated in Central America (Johnson & Morales 1972) and its wood is valued for a variety of uses.

2. *Cordia cardenasiana* J.S. Mill., Ann. Missouri Bot. Gard. 74(3):672–673, f. 2. 1987. (**Fig. 2**). TYPE: GUATEMALA. PETEN: Cardenas, on rocky hill, 1967, *Contreras 6835* (HOLOTYPE: LL; ISOTYPES: DS, F, LL, US).

Tree to 15 m tall, the twigs glabrous. Leaves deciduous; petioles 8–30 mm long, canaliculate on the adaxial surface, glabrous; blades elliptic, 4.4–11.4 cm long, 2.4–4.5 cm wide, the apex acute to acuminate, the base acute, the margin entire, the adaxial surface glabrous but evenly papillose, the abaxial surface glabrous. Inflorescences terminal, cymose-paniculate, to 15 cm long, 11 cm broad, the branches very short puberulent. Flowers distylous, on short spurs to 1.5 mm long; calyx tubular 5–6 mm long 3–3.8 mm wide at the mouth, unevenly lobed and tearing upon dehiscence or dehiscing circumscissily, striate or faintly costate, faintly short puberulent; corolla white, tubular with somewhat spreading lobes, 14.2–16.8 mm long, 5 merous, the lobes oblong, 5.2–6.2 mm long, 4.8–5.9 mm wide, the tube 4.7–5.1 mm long; stamens 5, the filaments 9.8–11.5 mm long, the upper 7–7.6 mm free, glabrous, the anthers oblong, 2.3–3 mm long; ovary obloid, 1.2–1.4 mm long, 1.3–2.5 mm broad; disc anular, 1.4 mm tall, 1.3 mm broad, glabrous; style 6.8–7 mm long, the stylar branches 1.4–1.6 mm long, the stigma lobes clavate. Fruits unknown.

Distribution and habitat.—This species is known only from the type locality in Petén, Guatemala, where it occurs in seasonally dry forests.

Cordia cardenasiana is a small tree that is presumably quite attractive in flower. It is probably most closely related to, and most easily confused with, *C. gerascanthus* with which it shares glabrous leaves, a terminal, cymose-paniculate inflorescence, and parallel-sided corolla lobes, but it differs in having a calyx that is shorter (less than 18 mm long) and the surface of its calyx is only striate or faintly costate, not distinctly ribbed.

3. *Cordia colimensis* I.M. Johnst., J. Arnold Arbor. 31:186. 1950. (**Fig. 3**). *Gerascanthus colimensis* (I.M. Johnst.) Borhidi, Acta Bot. Hung. 34:396. 1988. TYPE: MEXICO: COLIMA: Manzanillo, 1890, *E. Palmer 989* (HOLOTYPE: GH; ISOTYPES: G, K, LE, MO, NY, UC, US).

Tree to 10 m tall, the twigs glabrous with vertical, elliptic lenticels. Leaves deciduous; petioles 6–18 mm long, canaliculate on the adaxial surface, glabrous; blades lanceolate to narrowly elliptic (3.7–)5–10.5 cm long, 1.5–3(–3.7) mm wide, the apex attenuate to acuminate, sometimes acute, the base acute, the margin entire, the adaxial surface glabrous, the abaxial surface glabrous. Inflorescences terminal, compressed cymose-panicu-

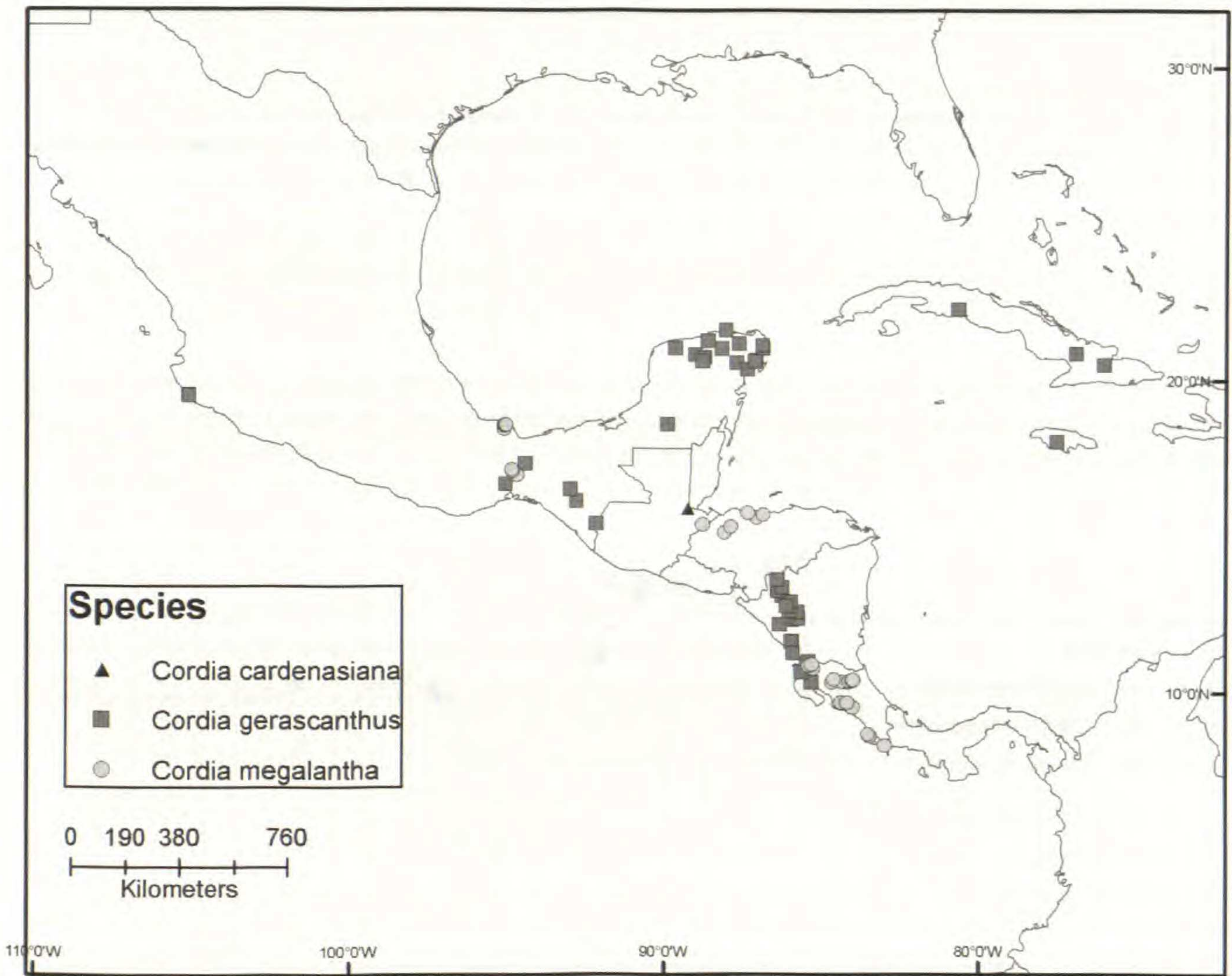


FIG. 2. Distributions of *Cordia cardenasiana*, *C. gerascanthus*, and *C. megalantha*.

late, to 6 cm long, 8.5 cm broad, 11–30 or more flowered, the branches of the inflorescence tomentose, the hairs wavy, short, dark brown. Flowers distylous, nearly sessile at the tips of inflorescence branches; calyx tubular, 12–15 mm long, 3–3.5 mm wide at the mouth, usually 5-lobed, sometimes with fewer lobes, the lobes unevenly shallowly triangular to deltate, 10-ribbed, each rib with a central furrow making the calyx appear falsely 20-ribbed, glabrous; corolla marcescent, white, funnellform, 2.8–3 cm long, 5-lobed the lobes very widely ovate to transversely widely oblong, 7–10 mm long, 9–11 mm wide, the tube 10–16 mm long, glabrous; stamens 5, the filaments 21–24 mm long, the upper 10–15 mm free, pubescent at the point of insertion, the anthers oblong, 2.5–3 mm long; ovary broadly obovoid, 1–2.5 mm long, 1–1.3 mm broad, glabrous; style 14–23 mm long, the stylar branches ca. 4 mm long, the stigma lobes clavate. Fruits unknown.

Distribution and habitat.—This species is known from only three collections from western Mexico where it occurs in coastal parts of Colima and Jalisco from sea level to 550 m in dry forests.

Specimens examined: **MEXICO. Jalisco**: hills between Bahía Navidad and La Manzanilla on Bahía Tenacatita, E facing summits 3 mi. W of the Autlan-Navidad highway, elev. 550 m, McVaugh 21017 (MICH); 1 km al N de La Manzanilla, sobre el camino a Tenacatita, Rzedowski 14846 (ENCB, MEXU, MICH, TEX).

4. *Cordia elaeagnoides* A. DC., Prodr. 9:474. 1845. (Fig. 3). *Lithocardium elaeagnodes* (A. DC.) Kuntze, Revis. Gen. Pl. 2:977. 1891. TYPE: MEXICO. OAXACA: Chjuitan inter Tehuantepec et Roca del Monte, Andrieux 197 (HOLOTYPE: G; ISOTYPE: K).

Cordia exsucca Sessé & Moçino, Fl. Mexic., ed. 2, 45–46. 1894. TYPE: MEXICO: habitat in Apatzingani aliisque calidissimis Novae Hispaniae locis. Floret Octobri, Sessé & Moçino s.n. (LECTOTYPE: MA).

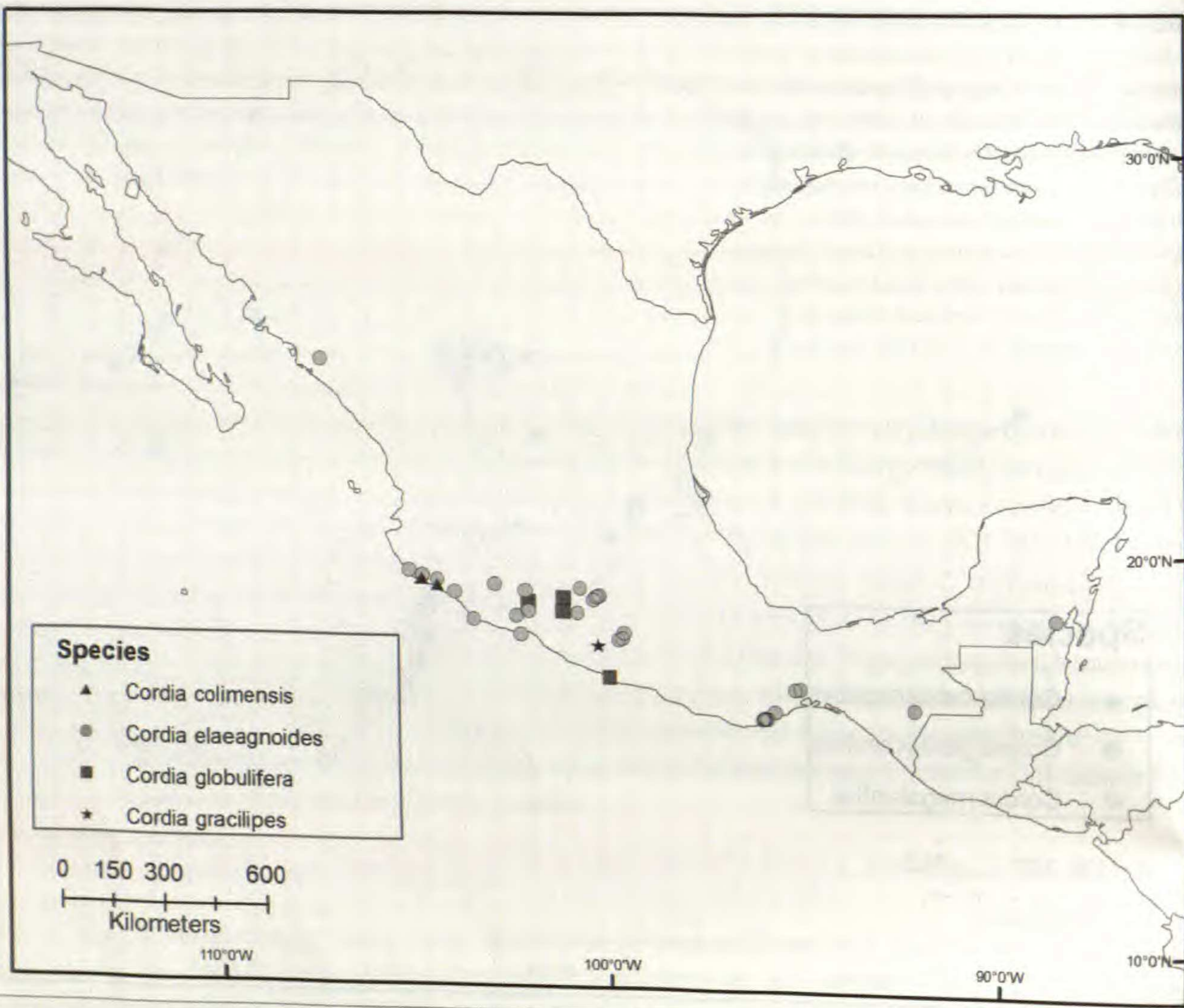


Fig. 3. Distributions of *Cordia colimensis*, *C. elaeagnoides*, *C. globulifera*, and *C. gracilipes*.

Tree to 15(-20) m tall, the bark furrowed, light brown, young twigs canescent, the hairs straight, 0.1 mm long or less, appressed. Leaves deciduous; petioles (12-)17-65(-85) mm long, flattened to canaliculate on the adaxial surface, canescent, the hairs straight, short, appressed; blades ovate, (4.5-)5.5-15.5(-21) cm long, (2.1-)3.5-10(-12.5) cm wide, the apex usually acuminate but sometimes acute or attenuate, the base usually obtuse and abruptly decurrent along the petiole but varying from acute to truncate, the margin entire, the adaxial surface glabrescent to rarely hirtellous, the hairs from a flat pedestal, stiff, short, appressed, the abaxial surface densely to sparsely canescent, the hairs straight, short, appressed. Inflorescences subtended by small leaves, near the end of branches, broad-flattened cymose-paniculate, compound, composed of separately arising branches variously terminal, lateral, and axillary, (12-)17-24(-30) cm broad, with 45-several hundred flowers, the branches canescent, the hairs straight, short appressed. Flowers distylous, on pedicels 1-3(-4) mm long, the buds apiculate; calyx urceolate to campanulate, (5.5-)6-8(-10) mm long, 4-5(-6) mm wide at the mouth, unevenly (10-)15(-18) ribbed, unevenly 5-lobed, the lobes apiculate, the surface canescent, the hairs 0.2-0.3 mm long, appressed; corolla marescent, white to cream, funnellform, 15-22 mm long, 5-lobed, the lobes oblong-ovate, (6-)8-11(-12) mm long, 5-6(-8) mm wide, the tube 5-8 mm long; stamens the same number as the corolla lobes, the filaments (6.5-)8-11(-12) mm long, the upper 1.5-3(-4) mm free, glabrous, the anthers oblong, 1.5-2 mm long; ovary ovoid to conical, 2-4 mm long, glabrous or rarely with scattered hairs, the stylar branches 1.8-3(-3.6) mm long, the stigma lobes clavate to discoid. Fruits enclosed by the persistent calyx and corolla, dark brown, dry, the stone ovoid, 5 mm long, 3 mm broad, endocarp bony.

Distribution and habitat.—*Cordia elaeagnoides* is a reasonably common species in dry forests of western

Mexico ranging from Chiapas in the south to Sinaloa in the north and it can be found from sea level to 1,200 m in elevation.

Representative specimens examined: **MEXICO. Chiapas:** San Geronimo, *Collins & Boyle* 23 (US). **Colima:** 15 km SSW of Colima on route 110 toward Manzanillo, *Miller et al.* 273 (MEXU, MO). **Guerrero:** along the road between Filo de Caballo and Milpillas, just W of Xochipala, ca. Km 13, elev. 1,000 m, *Miller et al.* 491 (MEXU, MO). **Jalisco:** along Mexican Highway 80 between La Huerta and barra de Navidad, between La Huerta and Km 231, elev. 500 m, *Miller et al.* 388 (MEXU, MO). **Mexico.** Calera, dist. Temascaltepec, elev. 790 m, *Hinton* 5378 (G, GH, K, NY). **Michoacan:** along the road between Ciudad Altamirano and Huetamo de Nunez, just N of El Pinazn Colorado, S. of San Lucas, elev. 370 m, *Miller & Tenorio* 657 (MEXU, MO). **Oaxaca:** Km 12 de la carretera Tehuantepec al S de Salina Cruz, elev. 25 m, *Cedillo Trigos & Lorence* 456 (MO). **Quintana Roo:** en el Palmar, a 7 km al sur de Ucum, sobre la carretera a La Unión, cerca del Ríp Hondo, *Cabrera et al.* 2636 (MO). **Sinaloa:** central plaza of Mocolito, *Breedlove* 16724 (CAS).

Cordia elaeagnoides is a common tree on the Pacific slope of western Mexico and is dominant in some of the places where it occurs. Originally considered sectionally distinct and placed in section *Rhabdocalyx* by DeCandolle (1845) because of its hard, bony-walled fruits, recent molecular studies show that it is definitely related to the other species of section *Gerascanthus* (Gottschling et al. 2005). It is distinct in its cymose inflorescences and hard, bony-walled fruits. Although this species seldom exceeds 15 m in height, it is highly valued for its wood in regions where it occurs. In western Mexico, it is one of the most commonly used species for the construction of furniture. Common names include "Grisiño" (Chiapas), "bocote," "gueramo" (Michoacán, Guerrero), "ocotillo meco" (Oaxaca) and "barsino" (Guerrero, Michoacán) (Standley 1924).

5. *Cordia gerascanthus* L., *Systema Naturae*, Editio Decima 2:936. 1759. (**Fig. 2**). *Lithocardium gerascanthus* (L.) Kuntze, *Revis. Gen. Pl.* 2:977. 1891. *Cerdana gerascanthus* (L.) Moldenke, *Phytologia* 1:16. 1933. TYPE: JAMAICA: *Patrick Browne* s.n. (LINN 253.5). Apparently unaware that there was a specimen in the Linnaean herbarium, Riedl designated, *Browne*, *Civ. Nat. Hist. Jamaica*, 170, t. 19, f. 3 (1756), superfluously as a lectotype in *Kalkman et al.* (ed.), *Fl. Malesiana*, ser.1, 13:77. 1997.

Cordia bracteata A. DC., *Prodr.* 9:472. 1845. *Lithocardium bracteatum* (A. DC.) Kuntze, *Revis. Gen. Pl.* 2:976. 1891. TYPE: CUBA: 1828, *Sagra* s.n. (HOLOTYPE: G).

Cordia gerascanthoides Kunth, *Nov. Gen. Sp.* 3:69. 1818. *Lithocardium gerascanthodes* (Kunth) Kuntze, *Revis. Gen. Pl.* 2:977. 1891. *Gerascanthus gerascanthoides* (Kunth) Borhidi, *Acta Bot. Hung.* 34:397. 1988. TYPE: CUBA: near Havana and port La Trinidad, *Bonpland* 1331 (HOLOTYPE: B).

Cordia langlassei Loes., *Repert. Spec. Nov. Regni Veg.* 12(322–324):240. 1913. TYPE: MEXICO. GUERRERO: Rives du Rio Coyuquilla, elev. 150 m, Feb 1899, *Langlasse* 834 (HOLOTYPE: B; ISOTYPES: G, GH, K, US).

Cordia rothschuhii Loes., *Bot. Jahrb. Syst.* 60(4):368. 1926. TYPE: NICARAGUA. MATAGALPA: ca. 1.8 km SW of ford of Rio Grande de Matagalpa on road to Terrabona, elev. 410 m, 12° 38' N, 86° 01' W, 26 Dec 1978, *W.D. Stevens* 11279 (NEOTYPE, here designated: MO). I confirmed that there is no specimen of Rothschuh at B and I borrowed the Central American material from BR, F, GH, L, and US where there were apparently some of his duplicates and there are no specimens there. I therefore conclude that the type at B (*Rothschuh* 462) was destroyed.

Tree to 15(–30) m tall, to 30 cm dbh, the bark light gray, smooth, the twigs glabrous. Leaves deciduous; petioles (8–)12–30(–40) cm long, canaliculate on the adaxial surface, glabrous; blades elliptic oblong to lance-ovate, (4.5–)6–15(–20) cm long, (2–)2.6–6(–8.5) cm wide, the apex acuminate or acute, the base acute to nearly obtuse, the margin entire, the adaxial surface glabrous, the abaxial surface glabrous. Inflorescences terminal, paniculate or condensed, often consisting of clusters of panicles, 2.5–12.5 cm long, 2.5–9 cm broad, the branches densely pubescent to tomentose, the hairs usually dark. Flowers distylous, sessile or on short spurs to 2 mm long; calyx tubular, 8–9(–9.8) mm long, 2.5–3.5 mm wide at the mouth, 10-ribbed, puberulent or strigillose to velutinous or pubescent, usually 4–5 lobed, the lobes uneven, deltate-acuminate, (0.7–)1.1–1.7 mm long; corolla white, tubular with spreading lobes, 20–27 mm long, 5-lobed, the lobes oblong, 8–10(–13) mm long, (5–)6–8 mm wide, the tube 6.2–8.5 mm long; stamens 5, the filaments in long-styled flowers 10.5–14 mm long, the upper 4.3–6.2 mm free, in short-styled flowers (12–)15–17(–21) mm long, the upper 6.7–11 mm free, puberulent to sparsely pubescent at the point of insertion, rarely glabrous, the anthers oblong, (2–)4–5 mm long; ovary depressed ovoid to ovoid, 0.7–1.3(–1.8) mm long, 1–1.6(–2) mm broad, glabrous; style in long-styled flowers 10–17 mm long, in short-styled flowers 8.5–11(–12) mm long, the stylar branches 2–3 mm long, the stigma lobes clavate. Fruits enclosed by the persistent calyx and corolla, brown, ellipsoid to narrowly ellipsoid, 7–8 mm long, 3.5–4 mm broad, one-seeded, the wall fibrous.

Distribution and habitat.—*Cordia gerascanthus* is one of the more wide-ranging species occurring from Jalisco and Tamaulipas, in northern Mexico, south through Central America as far as Guanacaste in Costa Rica and east into the Greater Antilles. It occurs in dry forests throughout its range from sea level to 1,000 m.

Representative specimens examined: **BELIZE:** Hill Bank, Record BH31 (CFMR, US). **CAYMAN ISLANDS:** Grand Cayman, Spot Bay, Millspaugh 1300 (NY). **COSTA RICA. Guanacaste:** entre Cañas y Tilarán, Fournier 1405 (SJ). **CUBA. Camaguey:** vicinity of La Gloria, Shafer 558 (US). **Isla de Pinos:** near Nueva Gorgona, Curtiss 370 (MO, US). **La Habana:** Santiago de Las Vegas, van Hermann 708 (F, US). **Las Villas:** Soledad, Cienfuegos, Jack 4721 (US). **Oriente:** Cabañas Bay, Britton & Cowell 12806 (NY, US). **Pinar del Rio:** Los Palacio to San Juan de Zayas, Shafer 11820 (MO, US). **Santa Clara:** Río San Juan, Britton et al. 5902 (NY). **EL SALVADOR. La Libertad:** La Libertad, Allen 7204 (F, LL, MICH, NY, UC, US). **San Vicente:** Tecoluca, elev 200 ft, Shannon 5044 (US). **GUATEMALA:** Los Andes District, Record G11 (CFMR, US). **HAITI. Grand-Anse:** Massif de la Hotte, western group, Dame Marie, near Faux-Cap, Ekman 10504 (US). **HONDURAS. Atlantida:** Lancelilla Valley, near Tela, elev. 20–600 m, Standley 53119 (F, US). **Comayagua:** Valley of Camayagua river, just off road Siguatepeque to Tegucigalpa, Stead & Styles 720 (US). **JAMAICA. Hanover:** Dias, elev. 500–650 ft, Proctor 20672 (NY). **Manchester:** Gut River, Proctor 35506 (MO). **Portland:** Happy Grove, near Hectores River, elev. 200 ft, Proctor 6497 (US). **St. Andrews:** Berwick, Hart s.n. (US). **St. Ann:** Union Hill, 2.5 mi. SSW of Moneague, elev. 1,900 ft, Proctor 6497 (US). **St. Elizabeth:** Pepper, elev. 250 m, Miller 1370 (US). **St. Thomas:** Cambridge Hill, elev. 900 ft, Proctor 8503 (US). **MEXICO. Campeche:** Mun. Calakmul, a 8 km al NE de Conhuás, camino a Nadzcaan, elev. 170 m, Martínez 34965 (MEXU, NY). **Chiapas:** Mpio. Chiapa de Corzo, Chorreadero de Tuxtla, 5.6 mi. E of Chiapa de Corzo along Mexican Highway 190, elev. 2,500 ft, Breedlove 9122 (F, MICH, US). **Guerrero:** road from Acapulco to Pié de la Cuesta, Carlson 3053 (F, NY). **Jalisco:** near the U.N.A.M. biological station at Chamela, along the turnoff from Mexican Highway 200 to Chamela, just beyond causeway, elev. near sea level, Miller et al. 403 (MEXU, MO). **Oaxaca:** Km 13, La Venta al S de La Ventosa, Cedillo Trigos 549 (MO). **Quintana Roo:** Coba, en el camino las Pinturas, elev. 20 m, Lopez et al. 1060 (MEXU). **Tamaulipas:** E slope of limestone Sierra del Abra 10 mi. W of main highway on Ocampo road, elev. 900 ft, Johnston & Crutchfield 5202 (MEXU, MICH, TEX). **Veracruz:** Mpio. de Paso de Ovejas, Mata Mateo, elev. 100 m, Ventura 7684 (ENCB). **Yucatan:** Calotmul, Gaumer 2161 (B, C, F, MO, US). **NICARAGUA. Boaco:** Santa Rita, SE of Empalme Boaco, elev. 220 m, Stevens 22849 (MO). **Esteli:** Km 179 on Highway 1, ca. 5.5 km S of bridge at Condega, elev. 560 m, Stevens 5761 (HNMN, MO). **Granada:** Granada, Orsted 12837 (C, US). **Managua:** Sierra de Managua, elev. 600–900 m, Garnier A572 (US). **Matagalpa:** ca. 1.8 km SW of Ford on Río Grande de Matagalpa on road to Terrabona, elev. 410 m, Stevens 11279 (HNMN, MO). **Nueva Segovia:** 2.8 km S of Mozonte—San Fernando road (at Km 239) along road to San Antonio, elev. 650 m, Stevens & Montiel 30519 (MO). **Rivas:** San Juan del Sur, camino entre Las Playas de Marsella y Rivas, elev. 0–100 m, Rueda et al. 1422 (MO).

Cordia gerascanthus is one of the more widespread members of the section found throughout Mexico, Central America, and the West Indies. It can be recognized by its combination of parallel-sided corolla lobes, evidently ribbed calyx, and paniculate inflorescence. It is unusual in exhibiting geographic variation in several characters that are generally fixed within other species. Populations in the Yucatán peninsula have glabrous staminal filaments, but they are pubescent at the point of insertion throughout the rest of its range. Populations in the Greater Antilles generally flower while the plants have leaves as opposed to the mainland populations that generally flower when leafless. The species is characterized by having parallel-sided corolla lobes and these are generally truncate at the apex, but rounded in some individuals from the west coast of Mexico. Hummingbirds have been observed as common pollinators in western Mexico (pers. obs.).

- 6. *Cordia glabrata* (Mart.) A. DC., Prodr. 9:473. 1845. (Fig. 4).** *Gerascanthus glabratus* Mart., Flora 21(2, Beibl. 4):87–88. 1838. *Lithocardium glabratum* (Mart.) Kuntze, Revis. Gen. 2:977. 1891. TYPE: BRAZIL. MINAS GERAIS: high dry campo near Contendas, Martius, Herb. Bras. 1569 (HOLOTYPE: M; ISOTYPES: B; F, MO, photos of M sheet).
- Cordia longipeda* Mez, Bot. Jahrb. 12:550. 1890. *Lithocardium longipedum* Kuntze, Rev. Gen. 2:977. 1891. *Cordia glabrata* var. *longipeda* Chodat, Bull. Soc. Bot. Genève, ser. 2, 12:212. 1921. TYPE: BRAZIL. MATTO GROSSO: Cuyabá, Martius Herb. Bras. 1068 (ISOTYPES: B, G-DC, K, NY).
- Cordia glabrata* var. *amambayensis* Chodat, Bull. Soc. Bot. Genève, ser. 2, 12:212. 1921. TYPE: PARAGUAY: Sierra de Amambay, Sep, Rojas in Hassler 10600 (HOLOTYPE: G-BOISS; ISOTYPES: B, BM, G-DEL).
- Lithocardium longipedum* var. *eriophyllum* Kuntze, Rev. Gen. 2:206. 1891. *Cordia glabrata* f. *eriophylla* (Kuntz) I.M. Johnst., Contr. Gray Herb. 92:13. 1930. TYPE: PARAGUAY: Concepción, Sep 1892, Kuntze s.n. (NY).
- Cordia glabrata* var. *orbicularis* Chodat & Vischer in Chodat, Bull. Soc. Bot. Genève, ser. 2, 12:212. 1921. TYPE: PARAGUAY: au pourtour du lac Ypacaray, Hassler 3222 (LECTOTYPE, here designated: G-00094802).
- Cordia longipeda* Mez, Rev. Gen. 2:977. 1891. *Lithocardium longipedum* (Mez) Kuntze, Revis. Gen. Pl. 2:977. 1891. *Gerascanthus longipedus* (Mez) Borhidi, Acta Bot. Hung. 34:397. 1988. TYPE: BRAZIL. MATTO GROSSO: Cuyabá, 30 Jun 1902, Malme 1869 (ISOTYPES: B, G, K, NY).
- Cordia longituba* Chodat & Vischer in Chodat, Bull. Soc. Bot. Genève, Ser. 2, 12:213. 1921. TYPE: PARAGUAY: Rincon, between Concepción and Horqueta, 1914, Chodat 363 (HOLOTYPE: G).

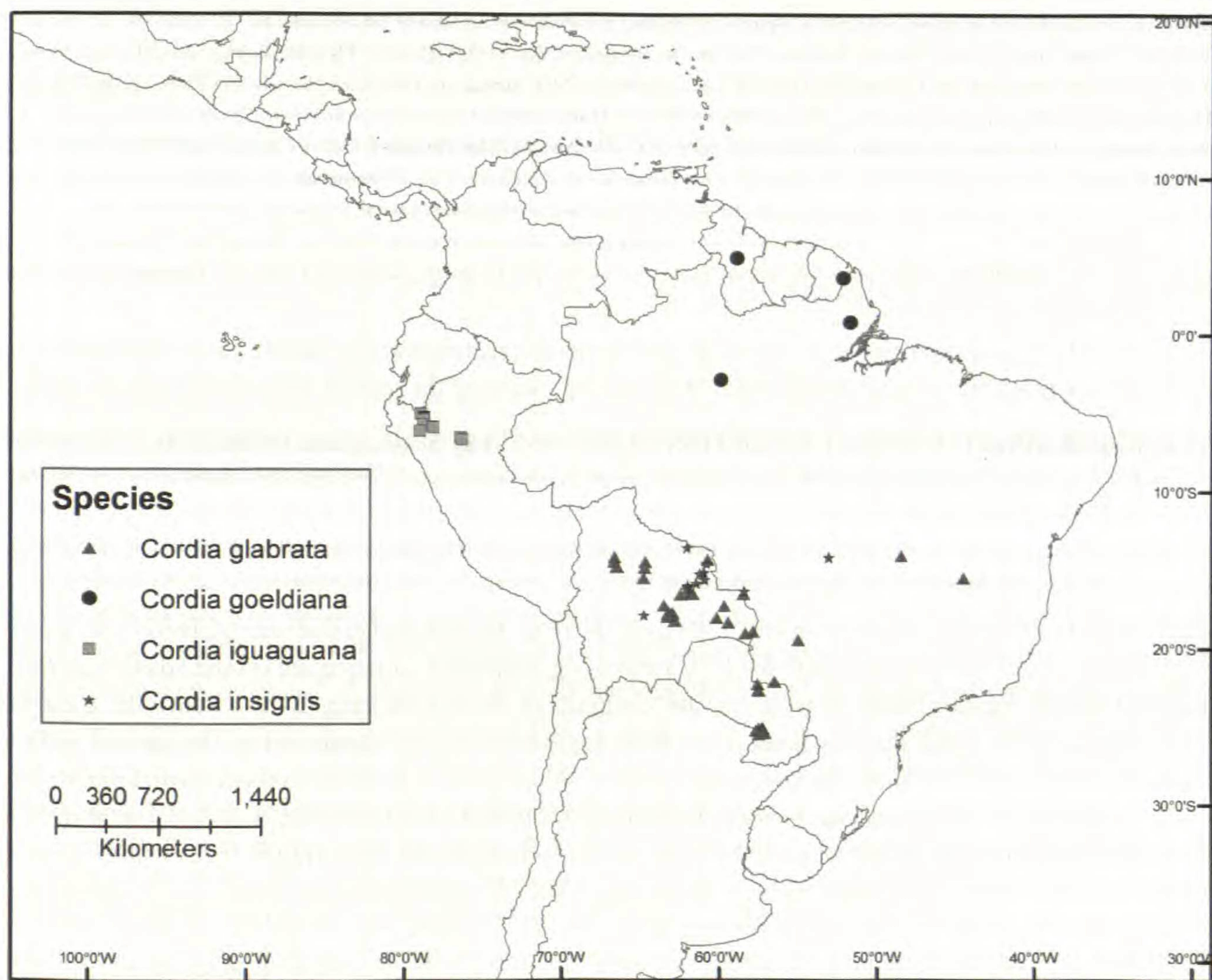


FIG. 4. Distributions of *Cordia glabrata*, *C. goeldiana*, *C. iguaguana*, and *C. insignis*.

Tree to 5(–6) m tall, the twigs sericeous when young, often hollow and inhabited by ants, the hairs malpighiaceus, later glabrous and waxy. Leaves deciduous; petioles (6–)11–27(–37) mm long, canaliculate to flattened on the adaxial surface, glabrous to sericeous; blades ovate to widely ovate, (3.5–)6–14(–20.5) cm long, (3–)4–9(–14) cm wide, the apex obtuse to acute or rounded and occasionally abruptly acuminate, the base rounded to obtuse, occasionally approaching subcordate, the margin entire, the adaxial surface glabrous and lustrous, sometimes with scattered patches of malpighiaceus hairs, the abaxial surface sericeous with malpighiaceus hairs or these sometimes fused and reduced with the abaxial surface appearing essentially glabrous. Inflorescences paniculate, (2–)6–10(–18) cm long, (2–)5–12 cm broad, the branches sericeous to densely puberulent. Flowers distylous, on short pedicels 1–2 mm long; calyx tubular, 8–10(–14) mm long, 3–4 mm wide at the mouth, prominently 10-ribbed, densely white puberulent, 3–5 lobed, the lobes uneven, ovate to deltate, 1–2 mm long; corolla white 21–28(–34) mm long, 5-lobed, the lobes oblong, parallel-sided or nearly so, or nearly rounded, 8–13 mm long, 7–10 mm wide, rounded at the apex, the tube 8–12 mm long; stamens the same number as the corolla lobes, the filaments 15–22 mm long, the upper 5–10 mm free, glabrous, the anthers oblong, 2–4 mm long; ovary ellipsoid, 2–3 mm long, the style 17–20 mm long, the stylar branches 2–4 mm long, the stigmas filiform. Fruits enclosed by the persistent calyx and corolla, brown, ovoid, 8–10 mm long, 5–6 mm wide, one-seeded, the wall fibrous.

Distribution and habitat.—*Cordia glabrata* occurs in SW Brazil and adjacent Bolivia and Paraguay, where it is found in dry forest and cerrado vegetation from sea level to 500 m.

Representative specimens examined: **BOLIVIA. Beni:** Prov. Ballivian, Espiritu en las zona de influencia del Río Yacuma, elev. 200 m, Beck 2588 (MO). **Santa Cruz:** Nuflo de Chavez, 1 km E of San Ramón, elev. 225 m, Nee 41582 (MO, NY). **BRAZIL. Bahia:** Santa Maria da Vitória, ca. de 5 km na Rod. Santa Maria da Virória/Bom Jesus da Lapa, Jardim 924 (MO). **Goias:** entre Brasília e Niquelandia, Pires et al. 9683 (F, US). **Matto Grosso:** Corumbá, próximo a Bolivia, Ellias de Paula 1448 (US). **Minas Gerais:** Entre Pirapora de Monte Claros, Castellanos 24239 (F). **Para:** Fazenda Prof. Getulino, near Redencao, Ratter et al. 6871 (NY). **PARAGUAY. Alto Paraguay:** Puerto Casado, Degen 3352 (CTES, FCQ, MO). **Amambay:** Parque Nacional Cerro Cora, cerca del Cerro Muralla, Soria 7163 (FCQ, MO). **Boqueron:** Col. Fernheim, Filadelfia, Vanni et al. 2122 (CTES, MO). **Central:** Ascunción, calle Artigas y Via Ferrea, Schinini 5092 (MO). **Chaco:** Parque Nacional Defensores del Chaco Cerro León, baldzone on top of Cerro León, Hahn 1559 (MO). **Concepcion:** Estancia Centurión, Potrero Central, elev. 200 m, Stevens et al. 26251 (FCQ, MO). **Cordillera:** Camino entre Emboscada, Arroyos Y Esteros, Río Piribebuy, Zardini 6793 (MO, PY). **Paraguari:** Pie de Cordillera, Campo orillas de montes, Rojas 1327 (AS, MO).

Cordia glabrata is a common species in central Brazilian cerrado vegetation and it can be easily recognized by its leaves that are pale white on the lower surface. It is the only species of the section with malpighiaceae hairs.

7. *Cordia globulifera* I.M. Johnst., J. Arnold Arbor. 31:184. 1950. (**Fig. 3**). *Gerascanthus globulifera* (I.M. Johnst.) Borhidi, Acta Bot. Hung. 34:397. 1988. TYPE: MEXICO. GUERRERO: Acapulco and vicinity, Oct 1894 to Mar 1895, Palmer 573 (HOLOTYPE: GH; ISOTYPES: F, K, MICH, MO, NY, UC, US).

Cordia nelsonii I.M. Johnst., J. Arnold Arbor. 31:183. 1950. *Gerascanthus nelsonii* (I.M. Johnst.) Borhidi, Acta Bot. Hung. 34:398. 1988. TYPE: MEXICO: E.W. Nelson 6924 (HOLOTYPE: GH; ISOTYPE: US).

Small tree to 6(-10) m tall, the bark smooth, light gray, the twigs sparsely strigillose, later glabrous and sparsely lenticillate. Leaves deciduous; petioles 15-33 mm long, shallowly canaliculate on the adaxial surface, sparsely to evenly hirsute; blades obovate or ovate to elliptic, (5-)8-14.5 cm long, (3-)5-7.5 cm wide, the apex acuminate or nearly acute, the base acute, sometimes asymmetrical, the margin entire, the adaxial surface scabrous, rough to the touch, the abaxial surface hirsute. Inflorescences terminal, condensed and nearly umbellate, generally less than 1 cm long. Flowers distylous; calyx tubular, 8-12 mm long, 4-4.8(-5.6) mm wide at the mouth, the ribs more or less obscured by the villous indument, the hairs translucent to silver-gray or golden, usually 5-lobed, the lobes uneven, deltate to shallowly triangular-acuminate, 1.3-2.5 mm long, 10-ribbed; corolla white, tubular with spreading lobes, (18-)21-25.5 mm long, 4-5-lobed, the lobes oblong to widely oblong, 7-9(-10.5) mm long, 5.3-8(-9) mm wide, the tube 5.5-8(-10) mm long; stamens 4-5, the filaments 12-16 mm long, the upper 5.5-10.5 mm free, glabrous, the anthers oblong, 2-3.5 mm long; ovary depressed ovoid, 1-1.5 mm long, 1-1.8 mm broad, glabrous; disc anular-crateriform, 1-1.6 mm tall, 1-2 mm broad, glabrous or sparsely ciliate; style in long-styled flowers 16-17 mm long, in short-styled flowers 7-8.2 mm long, the stylar branches 1-2.4 mm long, the stigma lobes clavate. Fruits enclosed by the persistent calyx and corolla, brown, ellipsoid, 5-6 mm long, 4-5.5 mm broad, one-seeded, the wall fibrous.

Distribution and habitat.—*Cordia globulifera* is known only from the western Mexican states of Guerrero, Jalisco, and Michoacan where it occurs in dry forests and flowers during the driest part of the dry season. The apparently disjunct, northern population near Mazatlán in Sinaloa has not been collected for approximately 90 years, so it is questionable as to what its status is and whether it still exists.

Specimens examined: **MEXICO. Guerrero:** along Mexican Highway 51, 10 km SE of Ciudad Altamirano, elev. 340 m, Miller & Tenorio 655 (MO). **Jalisco:** La Huerta, carretera Puerto Vallarta—Barra de Navidad, a ca. 15 km al NW de la Estación de Biología Chamela, Lott & Atkinson 2784 (MO); 4-22 km NW of Río San Nicolas and 20-40 km SE of Tomatlán, elev. 25-75 m, McVaugh 25275 (MICH). **Michoacan:** 15 km W of apatzingán on road to Buena Vista, elev. 450 m, McVaugh 22881 (ENCB, MICH); 27 km W of Huetamo de Nunez on dirt road to Nueva Italia, just W of Santa Rita, elev. 230 m, Miller & Tenorio 660 (MEXU, MO, NY); along dirt road to Nueva Italia, 36 km W of Huetamo de Nunez, elev. 220 m, Miller & Tenorio 662 (MEXU, MO, NY); along dirt road to Nueva Italia, 40 km W of Huetamo de Nunez, elev. 340 m, Miller & Tenorio 663 (MEXU, MO); along the dirt road to Nueva Italia, 75 km W of Huetamo de Nunez, 16 km W of Quetzeria, elev. 350 m, Miller & Tenorio 667 (MEXU, MO); along the dirt road between Huacana and Nueva Italia, 22 km N of Huacana, elev. 200 m, Miller & Tenorio 671 (MEXU, MO, NY); along Mexican Highway 51, 25 km S of Nueva Italia, elev. 210 m, Miller & Tenorio 672 (MEXU, MO, NY); cerca de Angamio, camino San Jeronimo-Churumuco, elev. 450 m, Soto & Boom 2053 (MEXU); en Palo Pintada, 18 km al S de la desviación al Infernillo, elev. 450 m, Soto & Boom 2062 (MEXU). **Sinaloa:** Mazatlán, Ortega 5597 (K, MEXU, US); Mazatlán, Bellavista, Ortega 6845 (BR, F).

Ivan Johnston (1950) described both *Cordia globulifera* and *C. nelsonii* both known to him only from the types, based on differences in length of calyx and corolla lobes, differences which have been obscured by additional collections. *Cordia globulifera* is an uncommon species of western Mexico that is infrequently collected, largely

because it flowers in the middle of the dry season when most other species are completely dormant. It can be recognized by its parallel-sided corolla lobes and condensed, nearly umbellate inflorescences, and it flowers while leafless.

8. *Cordia goeldiana* Huber, Bol. Mus. Goeldi Hist. Nat. Ethnogr. 6:89. 1910. (**Fig. 4**). *Gerascanthus goeldiana* (Huber) M. Kuhl. & Mattos, Loefgrenia 47:2. 1970. *Gerascanthus goeldianus* (Huber) Borhidi, Acta Bot. Hung. 34:397. 1988. TYPE: BRAZIL. PARÁ: Peixeboi, railroad between Pará and Braganca, 23 Sep 1907, *Goeldi s.n.* (MG8319) (HOLOTYPE: G-DEL; ISOTYPES: B, BM, F, GH, K, MG, RB, S, U, US).

Tree to 30 m tall, the branches glabrous, often lustrous, the axillary buds densely puberulent, at least when young. Leaves deciduous; petioles (13–)20–40(–48) mm long, narrowly canaliculate on the adaxial surface, glabrous; blades narrowly elliptic or lanceolate to elliptic-oblong or obovate, (7–)8–16 cm long, 2.5–7 cm wide, the apex narrowly acuminate to obtuse and abruptly acuminate, the base cuneate to decurrent or acute, the margin entire, the adaxial surface glabrous and lustrous, the abaxial surface glabrous. Inflorescences terminal, a panicle or cluster of small panicles, 7–12 cm long, 12–17 cm broad, the branches glabrous to sparsely puberulent but becoming densely puberulent near the tips. Flowers distylous, sessile, borne with the leaves; calyx tubular, 8.5–10.5 mm long, 5–6.3 mm wide at the mouth, the lobes 2–3, uneven, widely ovate, 2.8–3.8 mm long, lightly striate, sometimes not very evidently so, ribs not present smooth in bud, glabrous to short, brown tomentulose or granular puberulous; corolla marcescent, white, funnellform 22–30 mm long, 5-merous, the lobes oblong, parallel-sided, 11.5–17 mm long, 6.5–10 mm wide, the apex acute and sometimes uneven, the tube 5–7 mm long; stamens 5, the filaments 10.5–19 mm long, the upper 5.5–12 mm free, puberulent to villous at and just above the point of insertion, the anthers oblong, 2.4–4.3 mm long; ovary obovoid to ovoid-obloid, 1–2.6 mm long, 1.2–2 mm broad, glabrous; disc indistinct to anular and ca. 0.8 mm tall, 1.2–1.5 mm broad, glabrous; style 7–18 mm long, the stigma lobes clavate. Fruits not seen.

Distribution and habitat.—*Cordia goeldiana* is apparently localized near the mouth of the Amazon along the banks of its major tributaries and in adjacent French Guiana and Guyana. Little is known about its ecological preferences, but it presumably grows on tierra firme well back from the river banks.

Specimens examined: **BRAZIL. Amapá:** Rio Amapari, Serra do Navid, elev. 70–300 m, *Cowan 38447* (F, NY, US); Rio falsino, approx. 10 km upstream of confluence of Rio Arauari, west bank, *Rabelo 2378* (F, MO, NY). **Amazonas:** Reserva Florestal Ducke, Manaus-Itacoatiara, km 26, *Assuncao 642* (MO). **Pará:** Belém, *Ducke 788* (F, MO, NY, US); *Ducke 2345* (F, NY, US); Rio Xingu, inter Boa Pista et Altamira, *Ducke 11407* (US); Belém, I.A.N. mata do Cafezal, *Pires 1785* (NY); *Pires 1786* (NY); Km 8.3–11.5, line SW of Ilha de Breu, *Prance et al. 1492* (F, MO, NY, US). **Rondonia:** Basin of Rio Madeira, Km 12, road Guajará—Mirim to Abuña, *Prance et al. 6804* (MO, NY). **FRENCH GUIANA:** Saul, Route de Belizon, between Saul and Eaux Claires, elev. 200–300 m, *Mori 21614* (MO; NY). **GUYANA:** Station des Nouragues, bassin de l'Arataye, *Sabatier & Prévost 2695* (MO).

Cordia goeldiana can be distinguished by its glabrous leaves, parallel-sided corolla lobes, and calyx that lacks evident ribs. It is unusual in its occurrence in wet forests near the mouth of the Amazon.

9. *Cordia gracilipes* I.M. Johnst., J. Arnold Arbor. 31:186. 1950. (**Fig. 3**). *Gerascanthus gracilipes* (I.M. Johnst.) Borhidi, Acta Bot. Hung. 34:397. 1988. TYPE: MEXICO. GUERRERO: Campo Morado to Pueblo Viejo, tree 10 m. tall on rocky hillside, fl. white, 9 Nov 1939, *G.B. Hinton 14826* (HOLOTYPE: GH; ISOTYPES: DS, F, MEXU, MICH, NY, POM, U, UC, US).

Tree to 10 m tall, the twigs glabrous, with small elliptic lenticels, less than 1 mm long. Leaves deciduous; petioles (12–)15–25(–28) mm long, canaliculate to flattened on the adaxial surface, glabrous to villous; blades narrowly elliptic to elliptic to obovate, (5.5–)6–9(–10.8) cm long, 2.3–4(–4.5) cm wide, the apex acuminate to acute, the base acute, the margin entire, the upper surface glabrous, the lower surface sparsely pilose, most of the hairs restricted to the veins. Inflorescences terminal, paniculate or clusters of narrow panicles, 6–13 cm long, 6–16 cm broad, the branches of the inflorescence covered with a very short, dense, curly, dark-brown tomentum. Flowers distylous, short pedicellate or nearly sessile; calyx tubular, 9–11 mm long, 4–5 mm wide at the mouth, (8–)10-ribbed, puberulent, the hairs dense, curly, very short, dark-brown, (4–)5-lobed, the lobes shallowly triangular; corolla white, funnellform, 22–25 mm long, 5-lobed, the lobes widely depressed ovate, 7–8 mm long, 10–11 mm wide, the tube 9–11 mm long; stamens 5, the filaments 15 mm long, the upper 9 mm free, glabrous, the anthers oblong, 2 mm long; ovary cylindrical, 1 mm long, 1 mm broad, glabrous; style 19 mm long, the stylar branches 2.5 mm long, the stigma lobes clavate. Fruits unknown.

Distribution and habitat.—This species is still known from only the type collection made more than 80 years ago in central Guerrero in the dry forests of the hills of western Mexico.

Cordia gracilipes is still known only from the type collection made in a poorly collected area of central Guerrero. It is a distinctive species that can be recognized by its long-petiolate, glabrous leaves, calyx with short black hairs, and a ciliate nectariferous disc.

10. *Cordia guerckeana* Loes., Verh. Bot. Vereins Prov. Brandenburg 55:186. 1913. (**Fig. 5**). *Gerascanthus guerckeanus* (Loes.) Borhidi, Acta Bot. Hung. 34:397. 1988. TYPE: MEXICO. OAXACA: Cañada above Totolapan, 3 Jan 1896, E. Seler 1636 (LECTOTYPE: B; ISOLECTOTYPES: GH, K, NY).

Small tree or shrub to 6 m tall, the twigs glabrous, with circular to elliptic lenticels. Leaves deciduous; petioles (3–)5–10(–12) mm long, flattened to slightly canaliculate on the adaxial surface, short tomentose, the hairs somewhat deciduous, yellow-brown; blades coriaceous, elliptic to obovate, (3.7–)5.6–9.4(–10.5) cm long, (1.6–)2.8–5.6(–6.7) cm wide, the apex obtuse to rounded, the base acute or less commonly obtuse to rounded, the margin entire, the adaxial surface glabrous, the abaxial surface tomentose to arachnoid, the hairs wavy, thin, yellow-brown. Inflorescences terminal, paniculate, 6–15 cm long, 5–10 cm broad, the branches downy-tomentose, the hairs short, yellow-brown. Flowers distylous, short pedicellate to sessile; calyx tubular, 11–13 mm long, 3–4 mm wide at the mouth, pubescent, the hairs appressed, 10-ribbed; corolla white, funnelliform, 19–22 mm long, 5-merous, the lobes widely depressed ovate, 5–6 mm long, 7–9.5 mm wide, the tube 9–13 mm long; stamens 5, the filaments 15–18 mm long, the upper 6–10.5 mm free, glabrous, the anthers oblong, 2–2.5 mm long; ovary broadly ovoid, 1–1.5 mm long, ca. 1 mm broad, glabrous; disc depressed ovoid, ca. 1 mm tall, 1 mm broad, glabrous; style 11–19 mm long, the stylar branches 3.5 mm long, the stigma lobes clavate. Fruit unknown.

Distribution and habitat.—*Cordia guerckeana* is known only from a small area extending into the dry forested hills inland from Tehuantepec in the Mexican state of Oaxaca from sea level to nearly 1,000 m in elevation.

Specimens examined: **MEXICO. Oaxaca:** hills E of Tehuantepec, *Alexander 108* (NY); plain of Tehuantepec, *Alexander 173a* (NY); district of Tiacolula, 6 km al NE de Totolapan, Carretera Veg, elev. 800 m, *García-Mendoza et al. 2824* (MO); Mpio. Santa María Huatulco, terminación de pavimento de la carretera a Salina Cruz, ca. 50 km al E del entronque con la carretera Pochutla Puerto Angel, elev. 100 m, *Koch et al. 79547* (MO, NY); Tehuantepec, subida a las Ruinas del Cerro Guiengola, *Leticia Torres et al. 619* (MO); Plantavinta, *Liebmann sn.n* (F); San Carlos, *Liebmann 12729* (C, F, MO, UC, US); Puerto San Bartolo Río Hondo, *MacDougall 9303* (MEXU); Tehuantepec, Cerro Lieza, 2 km al NW de Tehuantepec, *Martínez 756* (MO); Totolapan, in canyon directly above town, elev. 940 m, *Miller & Tenorio 506* (MEXU, MO); Puerto San Bartolo, Río Hondo, *Miranda 9303* (US); Cañada above Totolapan, *Seler & Seler 1636* (K, NY).

The leaves of *Cordia guerckeana* are some of the most distinctive in the section due to the presence of an arachnoid-tomentose undersurface. This species apparently occurs only in western Mexico just inland from Tehuantepec, in the drainage of the Río Tehuantepec on hillsides above the river.

11. *Cordia ignaguana* Melch. ex I.M. Johnst., J. Arnold Arbor. 33:63. 1952. (**Fig. 4**). *Gerascanthus ignaguanus* (Melch.) ex I.M. Johnst. Borhidi, Acta Bot. Hung. 34:397. 1988. TYPE: PERU. CAJAMARCA: Prov. Jaen, Jaen, 700–800 m, Apr 1912, *Weberbauer 6213* (HOLOTYPE: GH; ISOTYPES: F, US).

Tree to 20 m tall, the twigs glabrous or very short puberulent. Leaves deciduous; petioles (9–)12–22 mm long, flattened to slightly canaliculate on the adaxial surface, glabrous or with a few scattered short hairs, or less commonly very short puberulent; blades lanceolate to ovate, (6.4–)10–15 cm long, (2.5–)4–5 cm wide, the apex attenuate or acuminate to acute, the base obtuse, the margin entire, the adaxial surface glabrous, but with scattered cystoliths, the abaxial surface glabrous, often with sparse, short, appressed hairs on the major veins. Inflorescences terminal, paniculate, often with a few small leaves scattered among the lower inflorescence branches, the branches short, brown tomentulose to glabrous. Flowers distylous; calyx tubular, 9.5–11 mm long, 2.5–3 mm wide at the mouth, 10-ribbed, 3–5-lobed, the lobes uneven, obtuse to triangular, 1–2 mm long; corolla white, 21–23 mm long, funnelliform, 5-lobed, the lobes broadly ovoid, 5–8 mm long, 8–10 mm wide, the tube 8–8.5 mm long; stamens the same number as the corolla lobes, the filaments 14–16 mm long, the upper (2–)7–9 mm free, glabrous, the anthers oblong, 1.5–3 mm long; ovary lanceoloid, 1–1.5 mm long, 0.6–1 mm broad, glabrous; disc

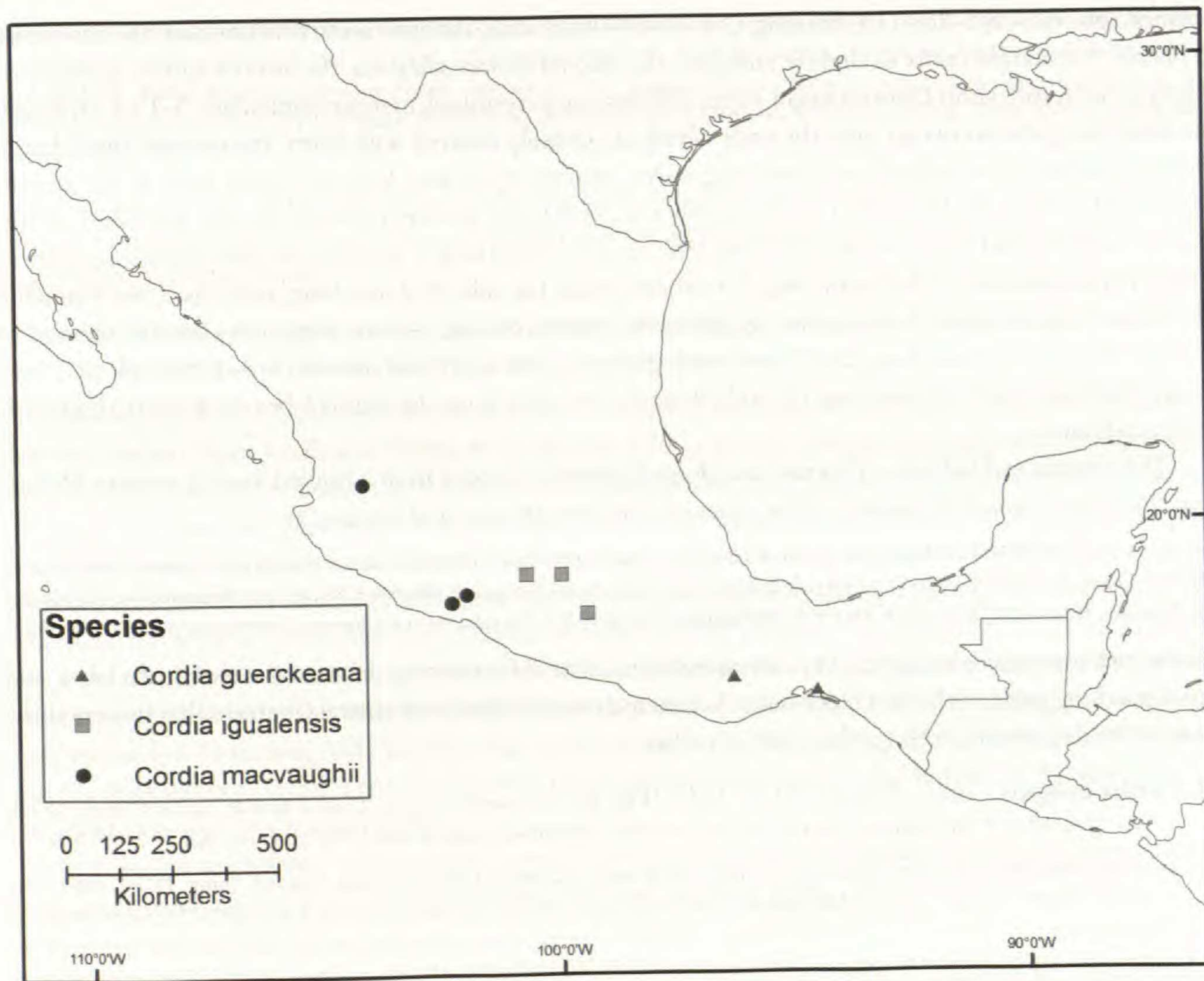


FIG. 5. Distributions of *Cordia guerckeana*, *C. igualensis*, and *C. macvaughii*.

not distinct from the ovary; style 6–11 mm long, the stylar branches 2–3 mm long, the stigma lobes clavate. Fruits enclosed by the persistent calyx and corolla, brown, ovoid, 7–8 mm long, 3–4 mm broad, one-seeded, the endocarp wall hard and bony.

Distribution and habitat.—This species is known from dry forests in the northern Peruvian states of Amazonas, Cajamarca, and San Martín.

Representative specimens examined: **PERU. Amazonas:** Prov. Luya, Km 276, entre Jazán y Bagua Grande, elev. 800–900 m, *Ferreyra* 15632 (MO). **Cajamarca:** San José de Lourdes, Nambacasa, elev. 1,650 m, *Campos & Campos* 4872 (NY); San Ignacio, Chirinos, entre Perico y Puerto Chuchuhuani, elev. 550–650 m, *Campos & López* 4962 (NY); Prov. Jaén, Jaén, carretera hacia “Los Naranjas,” elev. 760 m, *Díaz* 2074 (NY); Prov. Jaén, in the forest, elev. 500 m, *Woytkowski* 5599 (MO, US); Prov. Jaén, Jaén—San Ignacio road, N of Jaén, valley of Río Chinchipe, S of Tamborapa, elev. 700 m, *Gentry* 61020 (NY); Prov. Jaén, Shumba, desvío al oeste de la carretera entre Jaén y San Ignacio, *Sanchez Vega* 3934 (NY); along road Bagua Grande and Pedro Ruiz, elev. 500–1,000 m, *van der Werff* 14638 (NY). **San Martín:** 31 km S of Tarapoto, dry forested slopes overlooking Río Huallaga, elev. 350 m, *Gentry et al.* 37700 (MO).

Cordia iguaguana is an uncommon species of northern Peru that is distinctive in its glabrous leaves and calyx and its hard, bony-walled fruits.

12. *Cordia igualensis* Bartlett, *Contr. Gray Herb.* 36:632. 1909. (**Fig. 5**). *Gerascanthus igualensis* (Bartlett) Borhidi, *Acta Bot. Hung.* 34:397. 1988. TYPE: MEXICO. GUERRERO: Iguala Canyon, 28 Dec 1906, C.G. Pringle 13912 (HOLOTYPE: GH; ISOTYPES: ENCB, L, MEXU, US).

Tree to 15 m tall, the twigs glabrous. Leaves deciduous; petioles (8–)13–19(–28) mm long, canaliculate on the adaxial surface, nearly glabrous with sparse, short, appressed hairs; blades narrowly elliptic to ovate or slightly

oblanceolate, (5.7–)8.3–16(–17.5) cm long, (1.6–)4–6(–9) cm wide, the apex acute to acuminate, the base acute to obtuse, the margin entire to slightly undulate, the adaxial surface glabrous, the abaxial surface glabrous or nearly so with stiff, short hairs on major veins. Inflorescences terminal, cymose-paniculate, 5–13.5 cm broad, the branches glabrous except near the ends which are densely covered with short, interwoven, black hairs. Flowers distylous, on pedicels to 2 mm long; calyx tubular, 6.5–8 mm long, ca. 3 mm wide at the mouth, slightly puberulent, the hairs short, black, mostly restricted to the grooves between the ribs, 10-ribbed, nearly truncate with 5 small teeth; corolla white, funnellform, 23–34 mm long, 5-merous, the lobes depressed ovate to widely depressed ovate, 6.5–8 mm long, 8.5–10 mm wide, the tube 8–9 mm long; stamens 5, the filaments 14–17 mm long, the upper 7–10 mm free, glabrous, the anthers oblong, 2–3 mm long; ovary broadly obovoid to broadly oblong, 1–1.5 mm long, 1–1.7 mm broad, glabrous; disc depressed obovoid, 0.5–1 mm tall, ca. 1 mm broad, glabrous; style 9–16 mm long, the stylar branches 1–4 mm long, the stigma lobes thickened to flattened. Fruits unknown.

Distribution and habitat.—This rarely collected species is known from a limited area in western Mexico near the intersection of the borders of the states of Guerrero, México, and Michoacán.

Specimens examined: **MEXICO. Guerrero:** Cañon del Zopilote, cerca Venta Vieja, en Barranca, Km. 234 carretera Acapulco, *Miranda* 9248 (MEXU); Cañon del Zopilote, cerca Venta Vieja, laderas muy alteradas, cerca Zumpanga, *Miranda* 9280 (MEXU). **Mexico:** Dist. Temascaltepec, Acatitlán, *Hinton* 3176 (F, G, GH, K, MO, NY). **Michoacan:** 9 km al NW de Tayzupa hacia Coahuyana, *Soto Nuñeza & Torres* 2785 (MO).

Cordia igualensis can be recognized by its cymose-paniculate inflorescence, depressed ovate corolla lobes, and 6.5–8 mm long calyx with short black hairs. It is an uncommon species of central Guerrero that flowers at the onset of the dry season, in November and December.

13. *Cordia insignis* Cham., Linnaea 8:122. 1833. (Fig. 4). *Gerascanthus insignis* (Cham.) Borhidi, Acta Bot. Hung. 34:397. 1988. TYPE: BRAZIL: Minas Gerais, *Lhotzky s.n.* (HOLOTYPE: B). *Lithocardium insigne* (Cham.) Kuntze, Revis. Gen. Pl. 2:977. 1891.

Cordia haenkeana Mez, Bot. Jahrb. Syst. 12:560. 1890. *Gerascanthus haenkeanus* (Mez) Borhidi, Acta Bot. Hung. 34:397. 1988. TYPE: PERU?: *Haenke s.n.* (HOLOTYPE: M). Although the type is reported from Peru, this seems unlikely as the species have never been collected there.

Cordia insignis var. *glabrifolia* I.M. Johnst., Contr. Gray Herb. 92:11. 1930. TYPE: BRAZIL: Matto Grosso, Jul 1892, *Kuntze s.n.* (HOLOTYPE: NY; ISOTYPE: B).

Cordia jucunda Moore, Trans. Linn. Soc. ser. 2, 4:401. 1893. TYPE: BRAZIL: Matto Grosso, *Leeson s.n.* (HOLOTYPE: BM; ISOTYPE: A).

Cordia martii A. DC., Prodr. 9:471. 1845. TYPE: BRAZIL: in montibus Cyuabensibus, *Herb. Fl. Bras. n. 269* (ISOTYPE: K).

Cordia nettoana Taub., Bot. Jahrb. Syst. 15, Beibl. 38:11. 1893. *Gerascanthus nettoanus* (Taub.) Borhidi, Acta Bot. Hung. 34:398. 1988. TYPE: BRAZIL. RIO JANEIRO: Cabo Frio, *Glaziou* 11283 (HOLOTYPE: B; ISOTYPES: K, P).

Shrub to 3(–4) m tall, from a thickened underground xylopodium, in some cases the aerial stems annual, the twigs puberulent to tomentulose when young, later glabrous and waxy. Leaves deciduous; petioles (2–)12–23(–34) mm long, canaliculate to flattened on the adaxial surface; blades widely elliptic to elliptic or occasionally slightly ovate or obovate, (7–)12–22(–30) cm long, (4–)7–11(–17) cm wide, the apex obtuse to rounded or occasionally acute, the base rounded to obtuse, the margin entire, the adaxial surface rugose-bullate, glabrous and lustrous with only a few, widely-scattered hairs, the abaxial surface with the veins distinctly raised in a reticulate pattern, coarse pubescent along the veins. Inflorescences terminal, cymose-paniculate to cymose, 6–11(–23) cm long, (3.5–)6–11(–26) cm broad, the branches tomentulose, the peduncle (2–)5–14 cm long. Flowers distylous, the buds prominently apiculate; calyx tubular, 15–25 mm long, 4–6 mm wide at the mouth, prominently 10-ribbed, densely brown puberulent, 3–5-lobed, the lobes uneven, 2–3 mm long; corolla white to yellow, 33–40 mm long, 5-lobed, the lobes widely ovate, 8–10 mm long 8–10 mm wide, the tube 18–27 mm long; stamens 5, the filaments 16–26 mm long, the upper 5–7 mm free, the anthers oblong, 3–4 mm long; ovary ovoid to ellipsoid, 2–5 mm long, the style 15–25 mm long, the stylar branches 6–10 mm long, the stigmas clavate. Fruits enclosed by the persistent calyx and corolla, brown, ellipsoid, 10–15 mm long, 5–6 mm broad, one-seeded, the wall fibrous.

Distribution and habitat.—This species occurs in Cerrado and dry forests from the western part of Bahia to central Bolivia up to 500 m in elevation.

Representative specimens examined: **BOLIVIA. Beni:** Itenez, Parque Nacional Noel Kempff Mercado, Serrania San Simon, entre Remanso Y San Simon, elev. 250 m, *Arroyo P. et al.* 2604 (MO, USZ). **Santa Cruz:** Prov. Nuflo de Chavez, Concepción, *Krapovichas & Schinini* 31914 (MO). **BRAZIL. Bahia:** Brumado, Baixa dos Flores, *Sobrinhi* 255 (US). **Goias:** 100 km S of Guara, along Belém—Brasilia highway, elev. 500–800 ft, *Maguire et al.* 56118 (NY, US). **Mato Grosso:** Mpio. da Chapada dos Gjuimaraes, Rf Mutuca, MT251, 30 km NNE of Cuiabá, *Mori et al.* 16707 (MO, NY).

Cordia insignis is a very distinctive species of the Brazilian cerrado that is unusual in being a shrub, apparently growing from an enlarged root and at least in some cases the aerial stems are annual in duration, and also in its large, distinctly bullate leaves.

14. *Cordia latiloba* I.M. Johnst., *Contr. Gray Herb.* 92:9. 1930. (**Fig. 6**). *Gerascanthus latilobus* (I.M. Johnst.) M. Kuhl. & Mattos, *Loefgrenia* 47:2. 1970. TYPE: BRAZIL: Río Janeiro, *Glaziou* 1106 (HOLOTYPE: K; ISOTYPES: C, P, S).

Tree, the twigs glabrous. Leaves deciduous; petioles 15–45(–60) mm long, canaliculate on the adaxial surface, glabrous; blades elliptic to elliptic-oblong, 4–15 cm long, 2.5–7 cm wide, the apex abruptly short acuminate or acute, the base cuneate to obtuse, the margin entire, the adaxial surface glabrous, the abaxial surface glabrous. Inflorescences terminal, paniculate, 4–15 cm long, the branches glabrous or minutely brown puberulent or glandular. Flowers distylous; calyx tubular, 8–12 mm long, 2–3 mm wide at the mouth, 10-ribbed, glabrous or sparsely glandular-puberulent, 2–3-lobed, the lobes uneven, deltate or rounded to obtuse, 1.5–3 mm long; corolla white, funnellform, 25–33 mm long, 5-lobed, the lobes deltate to ovate, 5–11 mm long, 6–12 mm wide, the apex acute, the tube 10–12 mm long; stamens the same number as the corolla lobes, the filaments 18–25 mm long, the upper 8–14 mm free, with short stiff hairs at the point of insertion, the anthers oblong, 2–3 mm long; ovary ovoid, 1–1.5 mm long, 0.8–1.2 mm wide, glabrous; style ca. 20 mm long, the stylar branches 3–5 mm long, the stigma lobes clavate. Fruits enclosed in the persistent calyx and corolla, brown, ca. 12 mm long, 3.5 mm broad, one-seeded, the wall fibrous.

Distribution and habitat.—This species is reported only with imprecise localities in the area surrounding Río de Janeiro but has not been collected for more than one hundred years.

Specimens examined: **BRAZIL. Rio De Janeiro:** Río Janeiro, *Riedel s.n.* (NY, S).

Cordia latiloba is a rare species of southern Brazil that is very distinctive in its deltate corolla lobes with an acute apex.

15. *Cordia macrantha* Chodat, *Bull. Soc. Bot. Genève, sér. 2*, 12:215. 1921. (**Fig. 6**). *Lithocardium macranthum* (Chodat) Kuntze, *Revis. Gen. Pl.* 2:4387. 1891. TYPE: ECUADOR. GUAYAS: Guayaquil, *Ruiz & Pavon* 229 (HOLOTYPE: B; photo: US).

Tree to 10(–18) m tall, the twigs glabrous and waxy. Leaves deciduous; petioles (7–)14–31(–41) mm long, broadly canaliculate on the adaxial surface, puberulent or sparsely strigillose to glabrous; blades widely elliptic to elliptic-ovate, 10–30 cm long, 4.5–15.3 cm wide, the apex obtuse to rounded and often abruptly acuminate, the base obtuse, the margin entire, the adaxial surface glabrous, the abaxial surface villous to sparsely pubescent. Inflorescences terminal, cymose-paniculate or a cluster of panicles, 6–18 cm long, 9–16 cm broad, the branches puberulent above, often glabrous near the base. Flowers distylous, sessile; calyx tubular, 18.5–20 mm long, 6.4–6.9 mm wide at the mouth, prominently 10-ribbed, densely puberulent, 3-lobed, the lobes deltate-acuminate, 2–2.2 mm long; corolla white, tubular with spreading lobes, 40–41.5 mm long, 5-merous, the lobes very broadly ovate to depressed ovate, rounded at the apex, 10.3–14 mm long, 12.5–14.5 mm wide, the tube 17–19 mm long; stamens 5, the filaments 23–28 mm long, the upper 11–13.5 mm free, pubescent at the point of insertion, the anthers oblong, 3.3–3.5 mm long; ovary very broadly ovoid, 1.5 mm long, 1.8 mm broad, the disc annular, 0.9 mm tall, 1.2 mm broad, glabrous; style 20–25 mm long, the stylar branches 3 mm long, the stigma lobes clavate. Fruits enclosed by the persistent calyx and corolla, brown, ellipsoid, 9–11 mm long, 4.4–5 mm broad, one-seeded, the wall fibrous.

Distribution and habitat.—This species is endemic to Ecuador where it occurs in dry forests on the coastal plain up to 500 m in elevation.

Specimens examined: **ECUADOR. El Oro:** at Arenillas 6 km S, *Little* 6708 (F, NY, US). **Guayas:** Chongón, *Asplund* 7673 (NY, US); between Nobol and Isidro Ayora, *Asplund* 16659 (F, NY); Capeira, Km 21, Guayaquil to Daule, elev. 20–200 m, *Dodson & Dodson* 11356 (MO); Capeira,

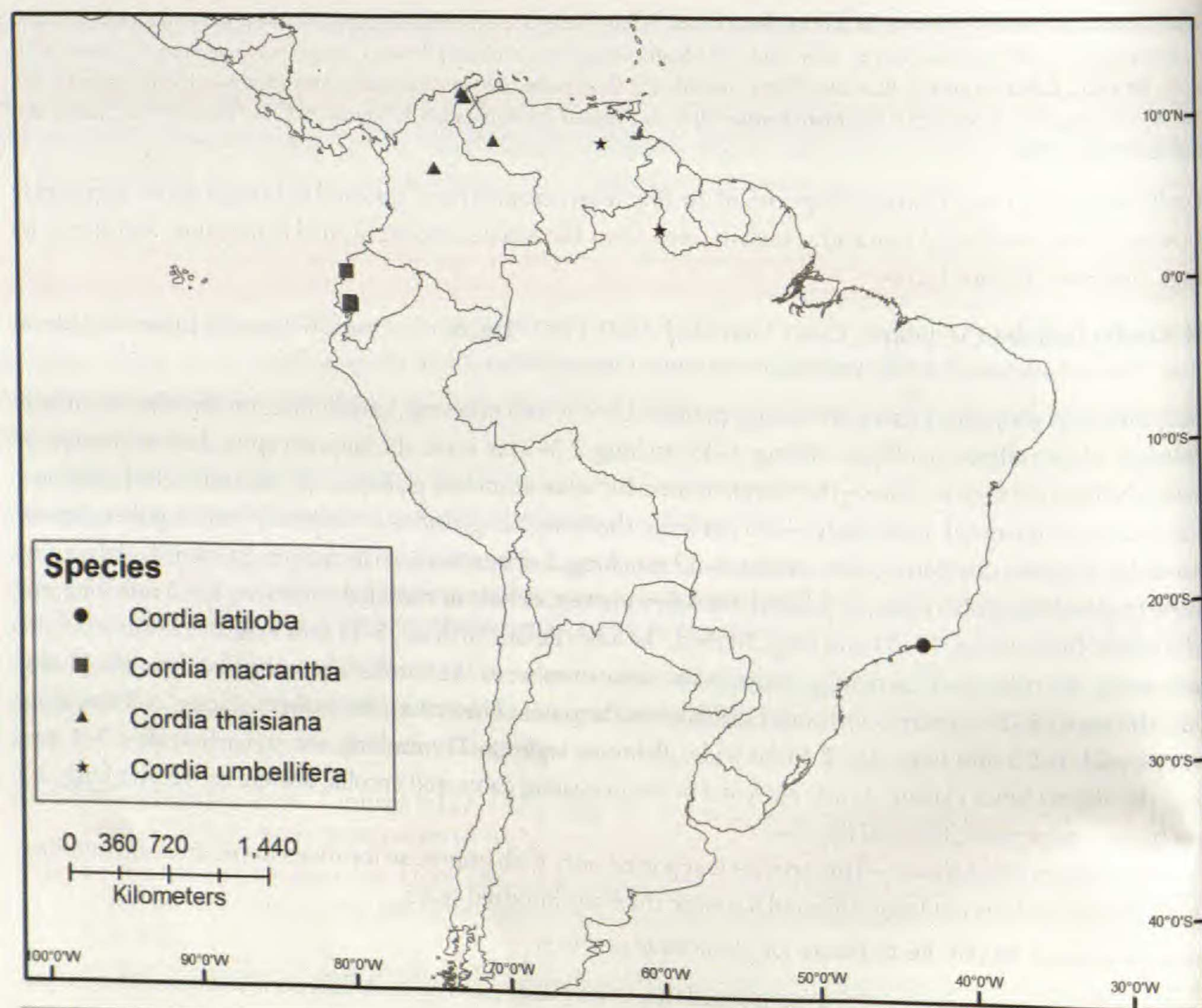


FIG. 6. Distributions of *Cordia latiloba*, *C. macrantha*, *C. thaisiana*, and *C. umbellifera*.

Km 21, Guayaquil to Daule, elev. 20–200 m, *Dodson & Dodson* 11453 (MO); Capeira, Km 21, Guayaquil to Daule, elev. 20–200 m, *Dodson & Gentry* 13849 (MO); Capeira, Km 21, Guayaquil to Daule, elev. 20–200 m, *Dodson & Gentry* 13850 (MO); Capeira, 22 km N of Guayaquil on road to Daule, elev. 20–150 m, *Gentry & Dodson* 54795 (MO); Capeira, 22 km N of Guayaquil on road to Daule, elev. 20–150 m, *Gentry & Dodson* 54796 (MO); Guayaquil Canton, Cerro Azul, carretera a Salinas, Km 13, elev. 350–500 m, *Rubio et al.* 1950 (MO, NY, QCNE); Guayaquil, *Ruiz & Pavon* 16/97 (MO photo of M specimen). **Manabi:** Pedernales, Estación Biológica Lalo Llor, a 22 km de la costa, elev. 125 m, *Cevallos & Neill* 208 (MO, QCNE).

Cordia macrantha is a distinctive species found in the dry forests of western Ecuador that is easily recognized by its unusually large leaves and flowers, cymose-paniculate inflorescence, and glabrous calyx.

16. *Cordia macvaughii* J.S. Mill., *Syst. Bot.* 11:179. 1986. (Fig. 5). TYPE: MEXICO. JALISCO: steep hillsides W of Magdalena, 15 km above Plan de Barranca, elev. 1,250 m, R. McVaugh 23505 (HOLOTYPE: MICH).

Tree 6–10 m tall, the twigs glabrous. Leaves deciduous; petioles 18–26 mm long, broadly canaliculate on the adaxial surface, puberulent; blades elliptic to widely elliptic, 13.3–13.9 cm long, 6.6–10.4 cm wide, the apex obtuse to rounded, the base obtuse to acute, the margin entire, the adaxial surface glabrous to strigillose, the abaxial surface densely puberulent. Inflorescences terminal, paniculate, 15–22 cm broad, the branches velutinous. Flowers distylous, short pedicellate, the pedicels 1.2 mm long; calyx tubular 7–10 mm long, 2.5–4 mm wide at the mouth, nearly truncate with 5 small acuminate teeth, these 0.5–1 mm long, prominently 10-ribbed, velutinous; corolla white, funnellform, 1.8–2.3 cm long, 5-merous, the lobes very widely ovate to widely depressed ovate, 6–7 mm long, 6–9 mm wide, the tube 8–11 mm long; stamens 5, the filaments 11–21 mm long,

the upper 5.5–11 mm free, the lowest portion of the free filaments thickened, pubescent at the point of insertion, the anthers oblong, 2–3 mm long; ovary cylindrical, ca. 1 mm long, 1 mm broad, glabrous; style 10.5–17 mm long, the stylar branches 1–2.5 mm long, the stigma lobes clavate. Fruits enclosed by the persistent calyx and corolla, brown, wall thin, fibrous, mature fruits not seen.

Distribution and habitat.—This species is endemic to western Mexico, where it occurs in dry forests of Jalisco and Michoacán between 600 and 1,300 m in elevation.

Specimens examined: **MEXICO. Jalisco:** between La Venta de Nochititlic and Barran quitas, on sides of barranca in heavily wooded areas along the Tepoic-Guadalajara Highway, elev. 950 m, *McVaugh 12044* (GH, MEXU, MICH). **Michoacan:** Hills in deciduous forest now nearly leafless, between Río Tepalcatepec and Arteaga, along the highway south from “Cuatra Caminos” (3 km S of Nueva Italia and 30 im E of Apatzingan), 40 im N of Arteaga, elev. 700 m, *McVaugh 22535* (ENCB, MICH); along Mexican Highway 37, 13 km S of the turnoff to Infernillo, at KM 234, elev. 660 m, *Miller & Téllez 3080* (MEXU, MO); along Mexican highway 37, 14 km S of the turnoff to Infernillo, at KM 235, elev. 660 m, *Miller & Téllez 3082* (MEXU, MO, NY).

Cordia macvaughii is a well-marked species characterized by a large paniculate inflorescence with branches covered with downy velutinous pubescence, corolla lobes that are wider than long, the lack of long pubescence on the calyx, and rather large, broad leaves. It appears to flower while leafless, shortly after the leaves are shed.

17. *Cordia megalantha* S.F. Blake, Proc. Biol. Soc. Washington 36:200. 1923. (**Fig. 2**). *Cordia macrantha* S.F. Blake (not Chodat), Contr. U.S. Natl. Herb. 24:19. 1922. *Gerascanthus megalanthus* (S.F. Blake) Borhidi, Acta Bot. Hung. 34(3–4):398. 1988. TYPE: GUATEMALA: Izabal, Quebradas, 18 May 1919, S.F. Blake 7498 (HOLOTYPE: US; ISOTYPE: G).

Tree to 30(–60) m tall, twigs glabrous, lenticellate. Leaves deciduous; petioles (8–)11–33(–55) mm long, canaliculate on the adaxial surface, glabrous; blades elliptic to obovate or rarely ovate, (4.6–)6–19(–21) cm long, 3–8(–12.6) cm wide, the apex acute to acuminate or rarely obtuse, the base acute or rarely obtuse to rounded, the margin entire, the adaxial surface glabrous, the abaxial surface glabrous. Inflorescences terminal, paniculate, to 22 cm long, 30 cm broad, the main branches glabrous, puberulent at the tips. Flowers distylous, on pedicels 2–5(–10) mm long; calyx tubular, (8.5–)9–10(–11) mm long, 4–5.5 mm wide at the mouth, striate to 10–20-ribbed, glabrous to puberulent, the hairs dark brown, unevenly lobed, tearing upon dehiscence or dehiscing circumscissily; corolla white, funnellform, 28–43(–50) mm long, 5(–6)-lobed, the lobes deltate to ovate, acute at the apex, (8.5–)11–13(–18) mm long, (8–)10–12.5 mm wide, the tube 7–9(–11.5) mm long; stamens 5(–6), the filaments 14.5–19 mm long, the upper 5–10(–13) mm free, pubescent at the point of insertion and frequently over the entire free portion, the anthers oblong, 2–2.6(–4) mm long; ovary ovoid to conical, 1.3–2.5(–4) mm long, 1–2 mm broad, glabrous; disc depressed obovoid, 0.5–1 mm tall, 1–2 mm broad, glabrous to ciliate; style (7.5–)16–19 mm long, glabrous or with a few scattered hairs, the stylar branches 3–4.5 mm long, the stigma lobes clavate. Fruits enclosed by the persistent calyx and corolla, brown, ellipsoid to narrowly ellipsoid, 8–12 mm long, 4–6 mm broad, one-seeded, the wall thin, fibrous.

Distribution and habitat.—*Cordia megalantha* ranges from southern Mexico south through the lowland, Atlantic wet forests to Costa Rica and also occurs in a disjunct population in wet forests of the Pacific slope on the Osa Peninsula of Costa Rica and adjacent Burica Peninsula of Panama up to 1,000 m in elevation.

Representative specimens examined: **COSTA RICA. Alajuela:** San Carlos, Llanura de San Carlos, Las Marina, elev. 500 m, *Zamora et al. 1505* (CR, NY). **Guanacaste:** Parque Nacional Rincón de la Vieja Quebrada Leiva, a 1.5 km aguas arriba de la casa de Pedro Leiva, elev. 1,000 m, *Rivera 1267* (MO, NY). **Heredia:** La Selva, *Bawa 606* (MO). **Limon:** vicinity of Guapiles, elev. 300–500 m, *Standley 37249* (US). **Puntarenas:** Rincón de Osa, Osa Peninsula, *Liesner 1941* (MO). **San Jose:** Fila Bustamante, Hacienda Tiquires, Los Ayarales, al S. del Río Toqiores, elev. 1,400 m, *Morales 4320* (CR, MO, NY). **GUATEMALA. Izabal:** lower Motagua, *Kuylén G147* (CFMR, F, GH, NY, US). **Peten:** La Libertad, *Lundell 3606* (F). **HONDURAS. Atlantida:** ca. 30 Km W of La Ceiba, elev. 40 m, *Stead S142* (FHO, MEXU, MO). **Yoro:** Road to El Progreso at 12 km from El Progreso, *Stead S198* (MO). **MEXICO. Chiapas:** Without definite locality, *Miranda 8324* (MEXU, US). **Oaxaca:** 5.8 km W de Esmeralda sobre terracería a Boca del Monte, 42 km N de Las Laguna, elev. 180 m, *Wendt et al. 3199* (MO, NY). **Veracruz:** Los Tuxtlas, *Gentry et al. 32294* (MO). **PANAMA. Chiriqui:** W of San Bartolo Limite near Costa Rican border, *Croat 22175* (MO).

Cordia megalantha is the tallest of all *Cordia* species, often exceeding 30 m, and occasionally reaching 60 m in height. It also has the largest flowers of any of the species of section *Gerascanthus*, with corollas 28–43(–50) mm long. It is easily recognized by its ovoid, apiculate buds and deltate corolla lobes with an acute apex. The calyx is generally not distinctly ribbed, but with 10–20 striations and the calyx opens by tearing into uneven lobes or it dehisces circumscissily.

18. *Cordia morelosana* Standl., Contr. U.S. Natl. Herb. 23:1220. 1924. (Fig. 7). *Gerascanthus morelosanus* (Standl.) Borhidi, Acta Bot. Hung. 34:398. 1988. TYPE: MEXICO. MORELOS: near Cuernavaca, elev. 5,000 ft, 17 Mar 1899, C.G. Pringle 8205 *pro parte* (LECTOTYPE, here designated: US (flowering branch): ISOLECTOTYPES: ARIZ, ASU, BR, C, CAS, F, G, GH, IND, K, L, MEXU, MICH, MO NY, POM, UC, US). In naming this species, Standley designated Pringle 8205 at US (sheet #3544555) as the holotype, but the specimen consists of flowering branches collected on 17 Mar 1899 and a branch with leaves collected on 29 Sep 1899, which represent two gatherings and are therefore an invalid type under articles 7 and 9 of the International Code of Botanical Nomenclature. Therefore, the flowering branches are here designated as the lectotype.

Spreading tree to 5(-8) m tall, the bark rough, dark gray, the twigs glabrous to hirsute. Leaves deciduous; petioles (3-)5-11(-16) mm long, flattened on the adaxial surface, hirsute; blades elliptic to widely elliptic, occasionally somewhat obovate, (2.4-)3-8(-9) cm long, (1.8-)2.5-5.7 cm wide, the apex obtuse to rounded, occasionally mucronulate, the base obtuse, often slightly assymetrical, the margin entire, the adaxial surface scabrous, the abaxial surface hirsute to less commonly strigose or scabrous. Inflorescences terminal, paniculate or condensed, to 3.5 cm long, 3.5 cm broad. Flowers distylous, sessile or on pedicels to 3(-7) mm long; calyx tubular, 11-14.5(-19) mm long, 4-5(-5.8) mm wide at the mouth, (2-)3-5-lobed, the lobes uneven, usually deltate-acuminate, 1.4-2.7(-3.5) mm long, 10-ribbed, the ribs more or less obscured by a villous indument, the hairs translucent or white to pale gray; corolla white, funnelform, (14-)27-33(-38) mm long, (4-)5-6(-8)-merous, the lobes widely depressed ovate to depressed ovate, (5.8-)7-10(-12.5) mm long, (7.6-)9-12.5(-14) mm wide, the tube (8.6-) 9-13(-15.7) mm long; stamens the same number as the corolla lobes, the filaments in long-styled flowers 11.5-16(-18) mm long, the upper 6-9 mm free, in short-flowered flowers (17.7-) 19-22(-25) mm long, the upper (9.6-) 10.5-12.5(-15) mm free, pubescent at the point of insertion of occasionally glabrous, the anthers oblong, 2.4-4 mm long; ovary depressed ovoid, 0.8-1.3 mm long, 1-1.8 mm broad, glabrous; disc annular-crateriform, 0.6-1.2 mm tall, 0.9-1.8 mm broad, glabrous to ciliate; style in long-styled flowers (15.5-)17-20 mm long, in short-styled flowers 8.7-13.6(-16) mm long, the stylar branches (1.5-)2.3-4(-5) mm long, the stigma lobes clavate. Fruits enclosed by the persistent calyx and corolla, brown, ellipsoid to narrowly ellipsoid, 7-8(-9.3) mm long, 2-4 mm broad, one-seeded, the wall fibrous.

Distribution and habitat.—*Cordia morelosana* is widespread in western and central Mexico in Guerrero, Jalisco, México, Michoacán, Morelos, and Puebla, where it occurs in dry forests and open areas from (340-)800-1,650 m in elevation.

Representative specimens examined: **MEXICO Guerrero:** 19 km S of Iguala on Mexican Highway 95 between Iguala and Chilpancingo, elev. 805 m, Miller *et al.* 674 (MEXU, MO, NY). **Jalisco:** A 1.5 km al NE de Ojo de Agua, elev. 1,350 m, Sousa *et al.* 3854 (MO). **Mexico:** Nanchititla, Hinton 3122 (GH, K). **Michoacan:** Along dirt road 18 km W of Nueva Italia, elev. 490 m, Miller & Tenorio 673 (MO). **Morelos:** Barranca de San Geronimo, cerca de Tepoztlan, elev 1,900 m, Rzedowski 22348 (ENCB, INIF, MICH). **Puebla:** 2 mi W of Acatlán, Wiggins 13251 (DS, SD).

Cordia morelosana is reasonably widespread in western Mexico. It can be recognized by its calyx that is villous and dense enough to conceal the ribs, corolla lobes that are wider than long, and leaves with an obtuse to rounded apex. It ranges from Jalisco east to Puebla and south to Guerrero and Morelos at (340-)800-1,650 m in elevation and is probably most closely related to and confused with *C. sonorae*, a species that mostly occurs further north and from sea level to 600(-1,000) in elevation, but overlaps in range in Michoacán and Guerrero. Both species flower while leafless and although the two species are quite distinct, flowering specimens can be very difficult to distinguish. *Cordia morelosana* is a spreading tree that lacks a central leader, has fissured dark gray bark, an obtuse to rounded leaf apex, leaves that are scabrous on the upper surface, and calyces with villous indument that generally conceals the ribs, while *C. sonorae* is an upright tree with a distinct central leader, with smooth pale gray bark, leaves with an acute apex and glabrous upper surface, and a calyx that is pubescent to vultinous, but generally not dense enough to conceal the ribs.

19. *Cordia sonorae* Rose, Contr. U.S. Natl. Herb. 1:106, t. 9. 1891. (Fig. 7). *Gerascanthus sonorae* (Rose) Borhidi, Acta Bot. Hung. 34:398. 1988. TYPE: MEXICO. SONORA: Alamos, 16-30 Sep 1890, E. Palmer 376 (HOLOTYPE: US; ISOTYPES: GH, K, MICH, NY, US). *Cordia palmeri* Rose, Contr. U.S. Natl. Herb 1:t. 9. 1891. This name appears on the illustration for the publication of *Cordia sonorae* so it seems likely that Rose chose this name and had the plant illustrated but then realized that Watson had used the name for an earlier plant and had it changed in the text but not on the illustration which is clearly of the same species.

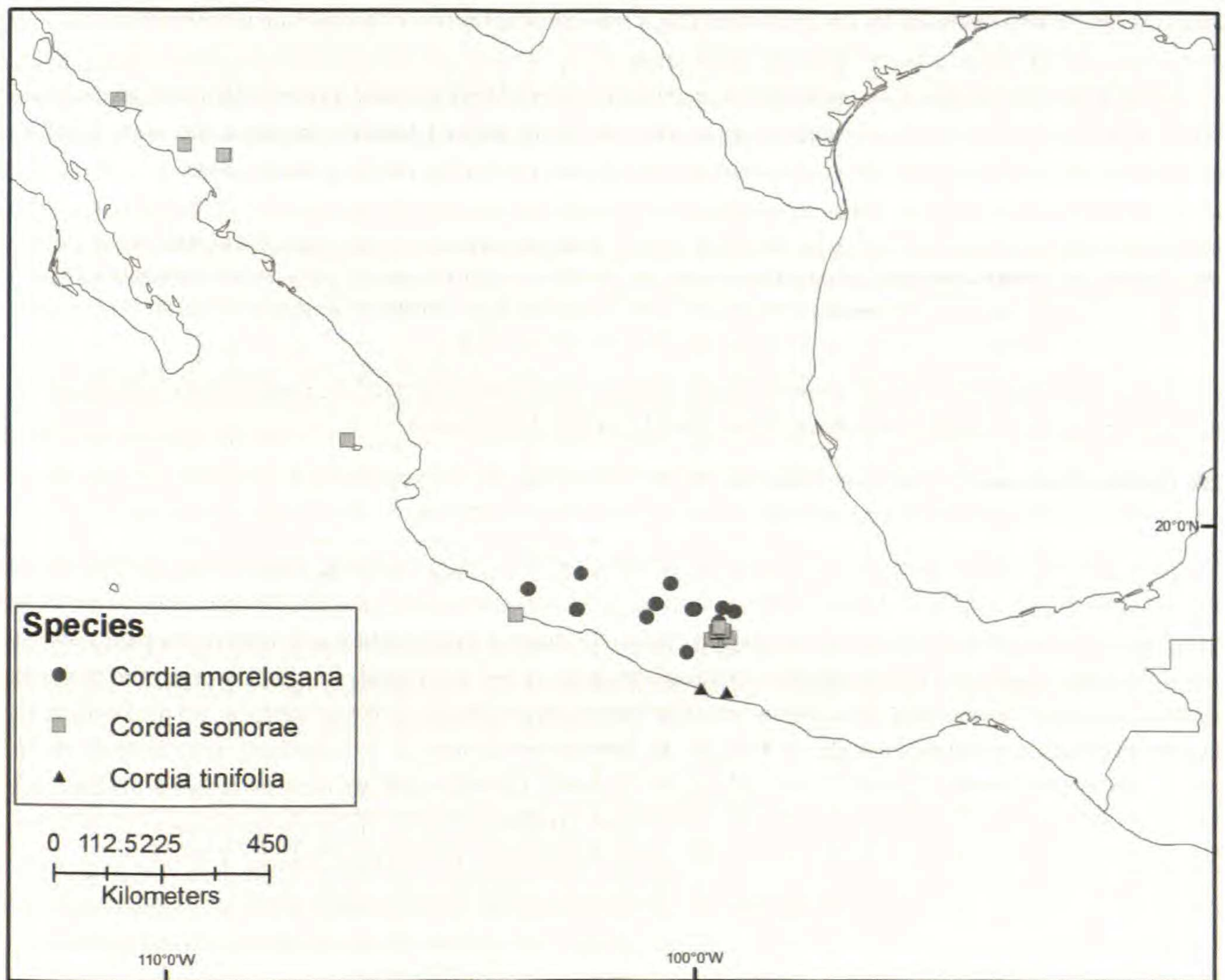


FIG. 7. Distributions of *Cordia morelosana*, *C. sonorae*, and *C. tinifolia*.

Erect tree to 5(–10) m tall, the bark light gray, smooth, the twigs sparsely strigillose or pubescent when young, later glabrous and sparsely lenticellate. Leaves deciduous; petioles (3–)6–14(–19) mm long, flattened or shallowly canaliculate on the adaxial surface, sparsely to evenly strigillose or pubescent with most of the hairs on the adaxial surface; blades usually elliptic, occasionally narrowly elliptic or ovate, (3–)4–13(–18) cm long, (1.4–)2.5–6.5(–8) cm wide, the apex usually acute, occasionally obtuse, the base obtuse to acute, the margin entire, the adaxial surface glabrous or nearly so, usually with numerous papillae, the abaxial surface glabrous or nearly so, often with scattered appressed hairs along the veins. Inflorescences terminal, solitary or clusters of sparsely branched panicles to 17 cm long, or condensed, often nearly umbellate, the branches villous to tomentose. Flowers distylous, sessile or on short pedicels to 3 mm long; calyx tubular, (10.6–)12.5–18(–20) mm long, (3–)4–5 mm wide at the mouth, 10-ribbed, pubescent or velutinous to occasionally villous, unevenly 3–5-lobed, the lobes deltate-acuminate, (1–)2–3(–4) mm long; corolla white, funnellform, 24–36 mm long, 5(–6)-merous, the lobes depressed ovate to rarely widely depressed ovate, 10–12.5(–14.6) mm long, (9–)10–1.5(–14.6) mm wide, the tube (8.4–)10.7–15.7 mm long; stamens 5(–6), the filaments in long styled flowers 16–23 mm long, the upper 5.7–9.5 mm free, in short-styled flowers (16–)19–27 mm long, the upper (9–)10–14.5 mm free, pubescent at the point of insertion or rarely glabrous, the anthers oblong, 2.8–4.1 mm long; ovary broadly depressed ovoid, 0.9–1.5(–2) mm long, 1–2 mm broad, glabrous; disc transversely ellipsoid to obloid, 0.8–1 mm tall, 0.9–1.8 mm broad, glabrous or sparsely ciliate at the upper edge; style in long-styled flowers 20–30 mm long, in short-styled flowers (9.5–)11–16 mm long, the stylar branches 2–4.6(–6.8) mm long, the stigma

lobes clavate. Fruits enclosed by the persistent calyx and corolla, brown, ellipsoid to narrowly ellipsoid, 7–10 mm long, 2–3 mm broad, one-seeded, the wall fibrous.

Distribution and habitat.—*Cordia sonora* occurs in western Mexico in dry forests with a northern population in Chihuahua and Sinaloa, a disjunct population on María Madre Island in Nayarit, and a more southern population in Michoacán and Guerrero. It ranges from sea level to 600(–1,000) m in elevation.

Representative specimens examined: **MEXICO. Chihuahua:** N side of Barranca de Batopilas, between Potrero and junction of Arroyo Samachique with Río Batopilas, elev. 600 m Bye 3458 (INIF, MEXU). **Guerrero:** 50 km S of Iguala, 11 km S of Río Mexcala, elev. 600 m, Miller *et al.* 678 (MO). **Michoacan:** along Mexican Highway 200 between Playa Azul and Tecomán, Colima, 6 km W of Marahuata, elev. 30 m, Miller & Tellez 3088 (MEXU, MO). **Nayarit:** María Madre Island, Nelson 4207 (F, US). **Sinaloa:** between Rosario and Villa Union, Gentry 12598 (LL, MEXU). **Sonora:** about 5 mi. below Minas Nuevas, Rose *et al.* 12668 (NY, US).

Cordia sonora is not uncommon in northwestern Mexico from Guerrero north to Sinaloa and Chihuahua. It is most easily confused with *C. morelosana* (see remarks under that species).

20. *Cordia thaisiana* G. Agostini, Brittonia 25:174. 1973. (**Fig. 6**). TYPE: VENEZUELA. ZULIA: between Maracaibo and Villa del Rosario, 15 Mar 1972, J. Steyermark, G.C. K. & E. Dunsterville 105,527 (HOLOTYPE: VEN; ISOTYPES: GH, NY, US).

Tree to 20 m tall, the twigs glabrous. Leaves deciduous; petioles 5–20 mm long, canaliculate on the adaxial surface, glabrous or nearly so; blades elliptic-obovate, 4–12 cm long, 1.5–4 cm wide, the apex short acuminate to acute, the base narrowly cuneate, the margin entire, the adaxial surface glabrous, sometimes pustulate, the abaxial surface glabrous. Inflorescences terminal, cymose, 3.5–5 cm broad, 12–15-flowered, the branches sparsely strigose. Flowers distylous, borne with the leaves; calyx tubular, 8–9 mm long, ca. 3.5 mm wide at the mouth, glabrous or nearly so, usually 3–4 lobed, the lobes uneven, ovate, 3–3.5 mm long, not evidently ribbed but merely striate; corolla white, 15–24 mm long, (4–)5-lobed, the lobes oblong, parallel-sided, 6–10 mm long, 5–8 mm wide, the tube 9–10 mm long; stamens the same number as the corolla lobes, the filaments 13–15 mm long, the upper 7–8 mm free, pubescent at the point of insertion, the anthers oblong, 4–5 mm long; ovary ovoid, 1–1.2 mm tall, 1 mm broad, glabrous; style 5–6 mm long, the stylar branches almost not evident, the four stigmas arising directly from the tip of the style, the stigma lobes clavate. Fruits enclosed by the persistent calyx and corolla, brown, ellipsoid, ca. 5 mm long, one-seeded, the wall fibrous.

Distribution and habitat.—*Cordia thaisiana* occurs in dry forests in western Venezuela and adjacent Colombia.

Specimens examined: **COLOMBIA. Atlantico:** Trail from Baranca to Campeche, Dugand 328 (F); in El Paraiso, Dugand 521 (F); road from Baranca to Campeche, Dugand 553 (F); Selva en las cercania de Molinero, elev. 50–150 m, Dugand 573 (US); near Molinero, Dugand 575 (F). **La Guajira:** along the rail road Corridor from the Cerrejón mine to Bahía Portete, *Arboleda s.n.* (MO); Mpio. Maicao, along the railroad corridor from the Cerrejón mine to Bahía Fortette, Bunch *et al.* 423 (MO); Carretera Ibania—Puerto Bolívar, Km 15–24, elev. 150 m, Roldán 1029 (MO, NY). **Santander:** Corregimiento de Puerto Olaya, Bufalera “El Bosque,” Reserva “Santa Isabela,” El Mango, elev. 220 m, Fonnegra *et al.* 8112 (HUA, MO); Corregimiento Puerto Olaya, Bufalera “El Bosque,” Reserva “El Ecuador,” Bosque Puerto Arturo, alrededor de Ciénaga “El Encanto,” elev. 220 m, Fonnegra 8171 (HUA, MO). **VENEZUELA. Barinas:** Reserva Forestal de Ticoporo, dist. Pedraza, elev. 100–150 m, Araque & Rodriguez-Carrasquero 16 (MO); Reserva Forestal de Caparo, al Norte de los Ríos Uribante Y Apure y al sur del Caño Anarú, Marcano-Berti 2860 (MO); Marcano-Berti 2894 (MO); Marcano-Berti 2895 (MO). **Falcon:** A lo largo de la carretera entre Dabajuro—La Danta—retera Maracaibo—Villa del Rosario—Machiques, Aristeguieta *et al.* 6791 (NY, VEN); Camino de Playa Bonita, Río Guasare, elev. 70 m, Medina 969 (VEN); Dist. Mara, along road 2 km S of Campamento Carichuano of Corpozulia, elev. 100 m, Steyermark *et al.* 122901 (MO, NY); Dist. Mara, 4 km (by air) N of Corpozulia Campamento Carichuano, elev. 150–200 m, Steyermark 123057 (MO, NY); Dist. Mara, 1 km W of Corpozulia Campamento Carichuano, elev. 80 m, Steyermark *et al.* 123143 (MO); Dist. Mara, near Hacienda La Bagueta, 2 km (by air) NE of Campamento Carichuano, elev. 80 m, Steyermark *et al.* 123310 (MO, NY).

Cordia thaisiana is easily recognized by its glabrous leaves, striate (not ribbed) calyx, and corollas lobes that are parallel-sided.

21. *Cordia tinifolia* Willd. ex Roem. & Schult., Syst. Veg. 4:800. 1819. (**Fig. 7**). *Gerascanthus tinifolius* (Willd. ex Roem. & Schult.) Borhidi, Acta Bot. Hung. 34:398. 1988. TYPE: MEXICO. GUERRERO: Acapulco, *ex herb.* Willd. (HOLOTYPE: B; fragment of type, G).

Tree 5–15 m tall, the twigs glabrous white-lenticellate. Leaves deciduous; petioles (2–)5–12(–20) mm long, flattened on the adaxial surface, glabrous; blades elliptic to narrowly elliptic, 4.2–13(–15) cm long, (1.5–)2–5.5

cm wide, the apex acute, the base acute, the margin entire to slightly undulate, the adaxial surface glabrous, the abaxial surface glabrous. Inflorescences terminal, paniculate, 5–10 cm long, branches short-tomentose to puberulent, the hairs dark brown. Flowers distylous, on pedicels to 5 mm long; calyx tubular, 8.5–11.5 mm long, 2.3 mm wide at the mouth, 4–5-lobed, the lobes variable, short teeth or deltate to 1 mm long, 10-ribbed, short-tomentose to sparsely pubescent, the hairs short, wavy, mostly restricted to grooves between the ribs; corolla white, funnellform, 21–27 mm long, 5-merous, the lobes widely depressed ovate, 3–7 mm long, 7–10 mm wide, the tube 11.5–18 mm long; stamens 5, the filaments 13–22 mm long, the upper 5.5–15 mm free, pubescent just above the point of insertion, the anthers oblong, 2–2.5 mm long; ovary broadly ovoid to broadly oblong, 0.7–1.5 mm long, 0.7–9.5 mm broad, glabrous; disc depressed obovoid, 0.2–0.7 mm tall, 0.7–1 mm broad, ciliate on the upper margin; style 12–13 mm long, the stylar branches 2–6.5 mm long, the stigmalobes clavate. Fruits unknown.

Distribution and habitat.—*Cordia tinifolia* is endemic to Guerrero and is known only from the dry forests in the vicinity of Acapulco.

Specimens examined: **MEXICO. Guerrero:** Acapulco, Gillis 10318 (A, MO, TEX); without definite locality, Haenke 1189 (F); hills W of Acapulco, Howell 8491 (CAS); Coluchuca, elev. 50 m, Langlasse 732 (G, GH, K, P, US); Costa Vera, Acapulco, Langman 3328 (MO); Mpio. San Marcos, 54 km al E de Acapulco, carretera Acapulco—Pinotepa Nacional, Martinez & Tellez 106 (MEXU, MO); Playa Roqueta Acapulco, Miranda 4085 (MEXU); Acapulco and vicinity, Palmer 236 (F, K, MEXU, MICH, MO, NY, US); Acapulco, Paray 1466 (ENCB); Acapulco, Rusby s.n. (K).

Cordia tinifolia is an infrequently collected species that occurs in the hills around Acapulco in western Mexico. It is distinct in its paniculate inflorescence, corolla with lobes wider than long, and short calyx only 8.5–11.5 mm long. It apparently flowers while it still has leaves.

- 22. *Cordia trichotoma*** (Vell.) Arrab. ex Steud., Nomencl. Bot. 419. 1840. (**Fig. 1**). *Cordiada trichotoma* Vell., Fl. Flumin. 98. Tab. 156, T. 2. 1825. *Gerascanthus trichotomus* (Vell.) M. Kuhl. & Mattos, Loefgrenia 47:1. 1970. TYPE: BRAZIL. DISTRITO FEDERAL: Silvis maritimis Regii Praedii Sanctae Crusis, Figure 156 in Volume 2 of Velloso, Flora Fluminensis Icones (LECTOTYPE, here designated). The specimens from which Velloso described new species were apparently deposited at R with duplicates sent to Lisboa and later transported to Paris, but no material has been located at any of these places. The illustration in Velloso's Icones is adequate to be recognized as the present species.
- Cordia asterophora* Mart. ex Fresen., Fl. Bras. 8:5. 1857. *Gerascanthus asterophorus* (Mart. ex Fresen.) Borhidi, Acta Bot. Hung. 34:396. 1988. *Lithocardium asterophorum* (Mart. ex Fresen.) Kuntze, Revis. Gen. Pl. 2:976. 1891. TYPE: BRAZIL. BAHIA: catingas, Dec 1818, Martius s.n. (HOLOTYPE: M; ISOTYPE: B).
- Cordia chamissoniana* Steud. (not G. Don, 1837), Nomencl. Bot. (ed. 2) 1:417. 1841. TYPE: BRAZIL: 1839. Riedl 62 (HOLOTYPE: BR).
- Cordia chamissoniana* var. *genuina* Chodat, Bull. Soc. Bot. Genève, sér. 2, 12:214. 1921.
- Cordia chamissoniana* var. *aemilii* Chodat, Bull. Soc. Bot. Genève, sér. 2, 12:214. 1921. TYPE: PARAGUAY: Sierra de Amambay, Hassler 11225 (LECTOTYPE, here designated: G; ISOLECTOTYPES: B, G, K). Chodat cited more than one specimen with the original description, and the collection cited here is the most widely distributed.
- Cordia chamissoniana* var. *blanchetii* Chodat, Bull. Soc. Bot. Genève, sér. 2, 12:214. 1921. *Cordia trichotoma* f. *blanchetii* (Chodat) I.M. Johnst., Contr. Gray Herb. 92:17. 1930. *Gerascanthus trichotoma* f. *blanchetii* (Chodat) M. Kuhl. & Mattos, Loefgrenia 47:1. 1970. TYPE: BRAZIL. BAHIA: Serra Jacobina, Blanchett 2559 (HOLOTYPE: G; ISOTYPES: B, BM, G, K, NY).
- Cordia chamissoniana* var. *gardneri* Chodat, Bull. Soc. Bot. Genève, sér. 2, 12:214. 1921. TYPE: BRAZIL: Crato, 1838. Gardiner 1780 (HOLOTYPE: G; ISOTYPES: GH, K, NY, S).
- Cordia chamissoniana* var. *martii* Chodat, Bull. Soc. Bot. Genève, sér. 2, 12:214. 1921. TYPE: BRAZIL: Martius Herb. Bras. 1067 (LECTOTYPE, here designated: G; ISOLECTOTYPES: B, BM, G, K, NY). This is the most widely distributed of the specified syntypes.
- Cordia chamissoniana* var. *nemorensis* Chodat, Bull. Soc. Bot. Genève, sér. 2, 12:214. 1921. TYPE: PARAGUAY: Ybytymi, Sep 1874, Bo-lansa 2030a (HOLOTYPE: G; ISOTYPE: K).
- Gerascanthus excelsus* Mart., Flora 21(2 Beibl. 4):86. 1838. *Lithocardium excelsum* (Mart.) Kuntze, Revis. Gen. Pl. 2:977. 1891. TYPE: BRAZIL: Martius Herb. Bras. 486 (HOLOTYPE: G; ISOTYPES: B, BM, K, NY). *Cordia excelsa* (Mart.) A. DC., Prodr. 9:473. 1845.
- Cordia frondosa* Schott., Syst. Veg. 4:403. 1827. TYPE: BRAZIL: ex Herb. Spreng. (HOLOTYPE: B).
- Cordia hassleriana* Chodat, Bull. Herb. Boissier, sér. 2, 2(9):815. 1902. TYPE: PARAGUAY: Cordillera de Altos, Hassler 3952 (HOLOTYPE: G; ISOTYPES: B, BM, G).
- Cordia hypoleuca* A. DC., Prodr. 9:472. 1845. *Lithocardium hypoleucum* (A. DC.) Kuntze, Revis. Gen. Pl. 2:977. 1891. *Gerascanthus hypoleucus* (A. DC.) Borhidi, Acta Bot. Hung. 34:397. 1988. TYPE: BRAZIL: circa Rio de Janeiro, 1834, Lund s.n. (HOLOTYPE: G; ISOTYPE: B).
- Cordia tomentosa* Cham. & Schldl., Linnaea 4:472. 1829. *Gerascanthus trichotoma* f. *tomentosus* (Cham. & Schldl.) M. Kuhl. & Mattos, Loefgrenia 47:2. 1970. TYPE: BRAZIL: Sellow 1571 (LECTOTYPE, here designated: B). *Cordia trichotoma* f. *tomentosa* (Cham. & Schldl.) I.M. Johnst., Contr. Gray Herb. 92:17. 1930.

Lithocardium gerascanthus var. *puberulum* Kuntze, Revis. Gen. 2:977. 1891. *Cordia trichotoma* f. *puberula* (Kuntze) I.M. Johnst., Contr. Gray Herb. 92:17. 1930. *Gerascanthus trichotoma* f. *puberula* (Kuntze) M. Kuhl. & Mattos, Loefgrenia 47:1. 1970. TYPE: ARGENTINA. SALTA: Tabacal near Orán, July 1873, Lorentz & Hieronymus 527 (HOLOTYPE: NY; ISOTYPES: B, G, S).

Tree 6–25 m tall, the twigs densely stellate-pubescent. Leaves deciduous; petioles 1–4 cm long, canaliculate on the adaxial surface, densely stellate-pubescent; blades ovate to lanceolate, elliptic, or obovate, 6–15 cm long, 3–8 cm wide, the apex acute, the base acute, the margin entire, the adaxial surface glabrous or with sparse stellate hairs, the lower surface densely stellate-pubescent to stellate-tomentose. Inflorescences terminal, cymose-paniculate, 8–30 cm broad, the branches densely stellate-pubescent. Flowers of three distinct morphs, two distylous morphs and one homostylous, non-herkogamous morph; calyx tubular, 6.5–9 mm long, ca. 2.5–3.5 mm wide at the mouth, 10-ribbed, stellate-pubescent, (4–)5-lobed, the lobes acute, ca. 1 mm long, or nearly not evident; corolla white, 12–17(–24) mm long, tubular with spreading lobes, 5–(6)-lobed, the lobes 6–9 mm long, 3–5 mm wide, the apex truncate, the tube 6–8 mm long; stamens the same number as the corolla lobes, the filaments 11–15 mm long, the upper 5–7 mm free, pubescent at the point of insertion, the anthers oblong, 2.5–3 mm long; ovary ovoid to broadly ovoid, 1–1.5 mm tall, ca 1 mm broad, glabrous; style 6–10 mm long, the style branches 2–3 mm long, the stigma lobes clavate. Fruits enclosed by the persistent calyx and corolla, brown, subcylindrical, one-seeded, the wall fibrous.

Distribution and habitat.—*Cordia trichotoma* ranges from Pernambuco in northeast Brazil through Bolivia and Paraguay into northern Argentina from sea level to 1,000 m.

Representative specimens examined: **ARGENTINA. Corrientes:** Santo Tomé, Ea. Bertrán (Infrán Cué), 23 km SW de Virasoro, Tressens, et al. 4021 (CTES). **Jujuy:** Quinta por Laguna de la Brea, Fries 172 (MO). **Salta:** Ruta 34 a la salida de Tetán rumbo a Gralguemes, en la proximidades del empalme con la Ruta 16, Novare 461 (MO). **Misiones:** Cerro Azul, Krapovickas et al. 15061 (F). **BOLIVIA. Beni:** Marban, elev. 200 m, Seidel et al. 6591 (M). **Chuquisaca:** Hernando Siles, Serranía Los Milagros, Pendiente media al Sur de la Laguna, elev. 1,630 m, Serrano et al. 7052 (HSB, MO, NY). **La Paz:** Bautista Saavedra, elev. 1,600 m, Zenteno 794 (M). **Santa Cruz:** Nuflo de Chavez, elev. 500 m, Killeen 975 (F, LPB, M). **Tarija:** Arce, 29.2 km S of Emborozú—Sidras road on road to Bermejo, (12.7 km S of Naranjo Agrio), elev. 600 m, Solomon 9969 (MO). **BRAZIL. Alagoas:** Mun. de Quebrangulo, Reserva Biológica de Pedra Ralhada, Cervi et al. 7192 (MO). **Bahia:** Mpio. of Traquara, Fazenda Pratinha, margin of Río San Antonio, 16 km SSE of Iraquara, elev. 600 m, Mori et al. 14413 (MO, NY). **Ceara:** Iparana, mata em restinga, Stehmann 28136 (MO). **Distrito Federal:** Bacia de Río de Sao Bartolomeu, Heringer et al. 4535 (MO, US). **Espirito Santo:** Linhares, J.S. 045/78 (MO). **Goias:** ca. 5 km S of Caiapônia, elev. 850 m, Anderson 9475 (US). **Maranhao:** Carolina, close to Río Lajes, Ratter 6767 (MO). **Minas Gerais:** Mpio. of Santa Luzia, in campo, between Venda Nova and Vespasiano, elev. 900–1,000 m, Williams & Assis 6741 (F, MO, US). **Mato Grosso:** Sidrolândia, Hatschbach 21783 (MO). **Parana:** Alto Parana, Rod. do Café, Hatschbach 14424 (F, US). **Pernambuco:** Tapera, Pickel 3113 (F, US). **Rio De Janeiro:** Rio de Janeiro, Riedl 572 (MO). **Rio Grande Do Sul:** San Leopoldo, Rambo 42203 (F). **Sao Paulo:** Mpio. Eiten et al. 3002 (MO, US). **Santa Catarina:** Dourado, Itapiranga, elev. 50 m, Klein 5234 (US). **PARAGUAY. Alto Parana:** Centre forestier du Haut Parana, 12 km a l'ouest de Ciudad del Este, Stutz 1394 (G, MO). **Caaguazu:** Ruta 2, Km 98, Zardini & Aguayo 10582 (FCQ, MO). **Caazapa:** Parque Nacional Caaguazú, Pérez de Molas 863 (MO). **Canindeyu:** Terreno del Banco Mundial, 34 km E of Villa Ygatimi near Río Jujui-mí, elev. 150 m, Gentry et al. 59399 (MO). **Central:** Villa Elisa, Pedersen 3175 (US). **Concepcion:** Arroyo Tagatiyá-Guazú at Estancia Bello Horizonte, elev. 270 m, Zardini & Guerrero 41198 (AS, MO). **Cordillera:** Altos, camino a Loma Granda, Basualdo 2603 (MO). **Guaira:** Colonia Independencia, Hahn 2207 (MO). **Paraguari:** 90 km NE Asuncion, Parque Nacional Ybycui, Little 40035 (MO). **San Pedro:** Calle Ovetense, 12 km al NE de Choré, Zardini & Benitez 3416 (MO, PY).

Cordia trichotoma is a common species in Eastern Brazil that ranges south through parts of Bolivia and Paraguay to northern Argentina. It is easily recognized by its stellate pubescence, generally velutinous on the lower leaf surfaces. It is most easily confused with *C. alliadora*, but differs in lacking ant domatia, having leaves that are velutinous below, and larger flowers. It is valued as a timber tree throughout its range.

23. *Cordia umbellifera* Killip ex Agostini, Acta Bot. Venez. 9:292. 1974. (Fig. 6). TYPE: VENEZUELA. GUARICO: near Dos Caminos, in light forest, Pittier 12531 (HOLOTYPE: VEN; ISOTYPES: F, G, GH, K, M, MO, NY).

Cordia wurdackiana Feuillet, BioLlania (Edición Especial) 6:331. 1997. TYPE: GUYANA: Rupununi District, Kusad Mountains, florest along creek on slope, 240–450 m, Jansen-Jacobs et al. 2696 (HOLOTYPE, US; ISOTYPE, MO).

Tree to 8 m tall, the twigs glabrous. Leaves deciduous; petioles 3–9 mm long, canaliculate on the adaxial surface, sparsely villous or glabrous; blades elliptic, 3.5–10 cm long, 0.9–3.7 cm wide, the apex acuminate to acute, the base acute, the margin entire, the adaxial surface glabrous, the abaxial surface glabrous. Inflorescences terminal, condensed, umbellate, 15–20-flowered, to 4 cm broad. Flowers distylous; calyx tubular, 11–13 mm long, 2–2.5 mm wide at the mouth, brown puberulent between the ribs, 5-lobed, but often only separating into

2–3 lobes, the lobes uneven, ovate, 0.5–2 mm long, evidently 10-ribbed; corolla white, funnellform, 18–21 mm long, (4–)5-lobed, the lobes 5.5–6 mm long, 4.5–4.7 mm wide, the apex acute, the tube 5–6 mm long; stamens 4–5, the filaments 12–17 mm long, the upper 7–9 mm free, pubescent at the point of insertion, the anthers oblong, ca. 2 mm long; ovary depressed ovoid, ca. 1 mm tall, 0.6–0.8 mm broad, the style 8–11 mm long, the stylar branches 2–4 mm long, the stigma lobes clavate. Fruits enclosed by the persistent calyx and corolla, brown, narrowly ellipsoid, 5.5–6 mm long, ca. 2.5 mm broad, one-seeded, the wall fibrous.

Distribution and habitat.—*Cordia umbellifera* occurs in Eastern Venezuela and adjacent Guyana from sea level to 450 m.

Specimens examined: **VENEZUELA. Bolivar:** Proc. Criollo, Ciudad Bolívar, entre el “Club Nautico Y Angosturita,” elev. 20 m, Diaz 6318 (MO); northern most slopes of Cerro Baraguan, 100–330 m, Wurdack & Monachino 41238 (MO, NY). **Guarico:** Entre Camatagua y El Sombrero, Aristeguieta 5985 (NY, VEN); 7289 (VEN); between Ortiz & Guárico Bridge, Pittier 12222 (NY); Ortiz-Galeras de El Pao, 20 km de San Francisco de Tiznado, Aristeguieta et al. 6269 (VEN); Paso Real, road to Cementerio, Plowman 1910 (US).

Cordia umbellifera is an uncommonly collected species that can be recognized by its corollas with lobes wider than long, pubescent staminal filaments, and highly condensed, umbellate inflorescences.

ACKNOWLEDGMENTS

I would like to thank Wayne Law for preparing the distribution maps. Thanks go to James I. Cohen and an anonymous reviewer for critical and constructive reviews. Kanchi Gandhi (GH) kindly looked at the typifications.

REFERENCES

- AIRY SHAW, H.K. 1973. A dictionary of the flowers plants and ferns. Cambridge University Press, UK.
- AVETISSIAN, E.M. 1956. Morphologie des microspores de Boraginaceae. Trudy Bot. Inst. Akad. Nauk. Armyansk. S.S.R. 10:7–66.
- DE CANDOLLE, A.P. 1845. Prodrômus systematis naturalis regni vegetabilis. Paris. Boraginaceae. 9:466–501.
- GIBBS, P.E. AND N. TARODA. 1983. Heterostyly in the *Cordia alliodora*-*C. trichotoma* complex in Brazil. Rev. Bras. Bot. 6:1–10.
- GOTTSCHLING, M., J.S. MILLER, M. WEIGEND, AND H.H. HILGER. 2005. Congruence of a phylogeny of Cordiaceae (Boraginales) inferred from ITS1 sequence data with morphology, ecology, and biogeography. Ann. Missouri Bot. Gard. 92:425–437.
- JOHNSON, P. AND R. MORALES. 1972. A review of *Cordia alliodora* (Ruiz & Pav.) Oken. Turrialba 22:210–220.
- JOHNSTON, I.M. 1930. Studies in the Boraginaceae 8. Observation on the species of *Cordia* and *Tournefortia* known from Brazil, Paraguay, Uruguay, and Argentina. Contr. Gray Herb. 92:3–89.
- JOHNSTON, I.M. 1950. Studies in the Boraginaceae 19. B. *Cordia* section *gerascanthus* in Mexico and Central America. J. Arnold. Arbor. 179–187.
- JOHNSTON, I.M. Studies in the Boraginaceae 20. Representatives of three subfamilies in eastern Asia. J. Arnold Arbor. 32:1–26; 99–122.
- KHALEEL, T.F. 1975. Embryology of *Cordia*. Bot. Gaz. 136(4):380–387.
- KHALEEL, T.F. 1982. Embryology of *Cordia sebestena* (Boraginaceae). Pl. Syst. Evol. 139:303–311.
- LAWRENCE, J.R. 1937. A correlation of the taxonomy and the floral anatomy of certain of the Boraginaceae. Amer. J. Bot. 24:433–444.
- MILLER, J.S. 2001. Two new species of *Cordia* L. (Boraginaceae) from Madagascar. Adansonia, sér. 3, 23:289–295.
- MILLER, J.S. AND M. GOTTSCHLING. 2007. Generic classification in the Cordiaceae (Boraginales): Resurrection of the genus *Varronia* P. Br. Taxon 56:163–170.
- NOWICKE, J.W. AND J.S. MILLER. 1989. Sectional placement of some problematic *Cordia* species (Boraginaceae). Syst. Bot. 14:271–280.
- NOWICKE, J.W. AND J.S. MILLER. 1990. Pollen morphology of the Cordioideae (Boraginaceae): *Auxemma*, *Cordia*, and *Patagonula*. Pl. Syst. Evol. [Suppl. 5], 103–121.
- NOWICKE, J.W. AND J.E. RIDGWAY. 1973. Pollen studies in the genus *Cordia* (Boraginaceae). Amer. J. Bot. 60:584–591.
- STANDLEY, P.C. 1924. Boraginaceae. In: Trees and shrubs of Mexico. Contr. U.S. Natl. Herb. 23:1216–1234.
- TARODA, N. AND P.E. GIBBS. 1986. Studies on the genus *Cordia* L. (Boraginaceae) in Brazil. 1 A new infrageneric classification and conspectus. Revista Brasil. Bot. 9:31–42.
- WHEELER, W.M. 1942. Studies of Neotropical ant-plants and their ants. Bull. Mus. Comp. Zool., Harvard 90:1–262.